

From: Whittaker, Laura [laura.whittaker@aptim.com]
Sent: Tuesday, August 7, 2018 5:23 AM
To: Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]
CC: Slack, Matthew L CIV SEA 04 04N [matthew.slack@navy.mil]; Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Noble, Kimberly K CIV SEA 04, NAVSEA DET RASO [kimberly.k.noble1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Guillory, Jeffrey [jeffrey.guillory@aptim.com]; Meldrum, Amy [amy.meldrum@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Gerg, David [david.erg@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]
Subject: [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY B5 (Use 8)
Attachments: HPNS APTIM RSY B5 (Use 8) Soil Non-LLRW Concurrence Request 0807018 (reduced).pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.



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APTIM
Hunters Point Naval Shipyard
200 Fisher Avenue
San Francisco, CA 94124



Hunters Point Naval Shipyard, Parcel E-2 RSY Data Report

Contract No. EMAC III CTO-0013					
RSY Pad: B5	RSY Pad Use Number: USE 8	First Submittal <input checked="" type="checkbox"/>	Second Submittal <input type="checkbox"/>		
Data attached and submitted by: Laura Whittaker	Data Report Submittal Date: 08/07/2018				

Soil Sample Data					
Sample Identification	Survey Location	Type of Sample	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
	Upper limit of site reference background				
PE2-RSYB5-U8-S001	1	Systematic	0.535	-0.0145	0.0349
PE2-RSYB5-U8-S002	2	Systematic	0.588	0.0189	N/A
PE2-RSYB5-U8-S003	3	Systematic	0.644	-0.0470	N/A
PE2-RSYB5-U8-S004	4	Systematic	0.553	-0.0251	N/A
PE2-RSYB5-U8-S005	5	Systematic	0.453	0.00274	N/A
PE2-RSYB5-U8-S006	6	Systematic	0.323	0.0152	N/A
PE2-RSYB5-U8-S007	7	Systematic	0.556	-0.0255	N/A
PE2-RSYB5-U8-S008	8	Systematic	0.575	-0.0553	N/A
PE2-RSYB5-U8-S009	9	Systematic	0.647	-0.0239	N/A
PE2-RSYB5-U8-S010	10	Systematic	0.714	-0.0231	N/A
PE2-RSYB5-U8-S011	11	Systematic	0.494	0.00913	0.00118
PE2-RSYB5-U8-S012	12	Systematic	0.509	0.0150	N/A
PE2-RSYB5-U8-S013	13	Systematic	0.583	0.0176	N/A
PE2-RSYB5-U8-S014	14	Systematic	0.558	0.0167	N/A
PE2-RSYB5-U8-S015	15	Systematic	0.604	-0.0489	N/A
PE2-RSYB5-U8-S016	16	Systematic	0.154	-0.0164	N/A
PE2-RSYB5-U8-S017	17	Systematic	0.662	0.0291	N/A
PE2-RSYB5-U8-S018	18	Systematic	0.625	0.0390	N/A

²²⁶Ra Radium-226¹³⁷Cs Cesium-137

Sr Strontium

pCi/g Picocuries per gram

Instrument and Survey Data										
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-06292018-PE2-ROV2-2680	06/29/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	N/A	N/A	3,400 CPS	4,872 CPS	2,753-3,660 CPS
RSI Follow-up Static Survey	HPRS-07062018-PE2-JSS-2-2716	07/06/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	3,612 CPS	4,255 CPS	N/A	N/A	3,138-3,551 CPS
Systematic Sample Survey	HPRS-07022018-PE2-JSS-2694	07/02/2018	2221	07/12/2018	271439	15.783 CPM	18,714 CPM	N/A	N/A	13,102-15,412 CPM

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary
1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).
2) RSI Follow-up static survey—14 locations identified during the data review process were investigated, with readings less than the Reference Area static IL at all locations for regions of interest (ROIs) 3, 6, 7, 8, and 10 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7).
3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 25-48). Ten percent of the systematic soil samples (two samples in total, PE2-RSYB5-U8-S001 & PE2-RSYB5-U8-S011) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 25-48).
Conclusions: All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 14 locations were investigated during the follow-up static survey, with readings less than the Reference Area static IL at all locations for ROIs 3, 6, 7, 8, and 10 (VD1). Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 9-22). Final analytical results for systematic samples from this RSY pad are concluded to be comparable to background. Histograms showing soil sample activity concentrations are provided (pages 23-24). Ten percent of the systematic soil samples (two samples in total, PE2-RSYB5-U8-S001 & PE2-RSYB5-U8-S011) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1). RSY B5 (Use 8) contains soil from the chemically contaminated (Lead- greater than project action limit) over-excavation area of Freshwater Wetlands Survey Unit 05 (FW-05). APTIM request RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be dispositioned as non-LLRW waste and to be disposed of off-site at a CERCLA landfill.

RSI Data Evaluation Process

RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review:** The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review:** The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs:**
 - **Z-Scores:** The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three ($Z>3$) is marked for follow-up.
 - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local $Z>3$ is marked for follow-up.
 - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local $Z>3$ is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
 - Z-Scores: The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a $Z>3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local $Z>3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local $Z > 3$ is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **Z-Score Time Series Review:** The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score > 3 in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

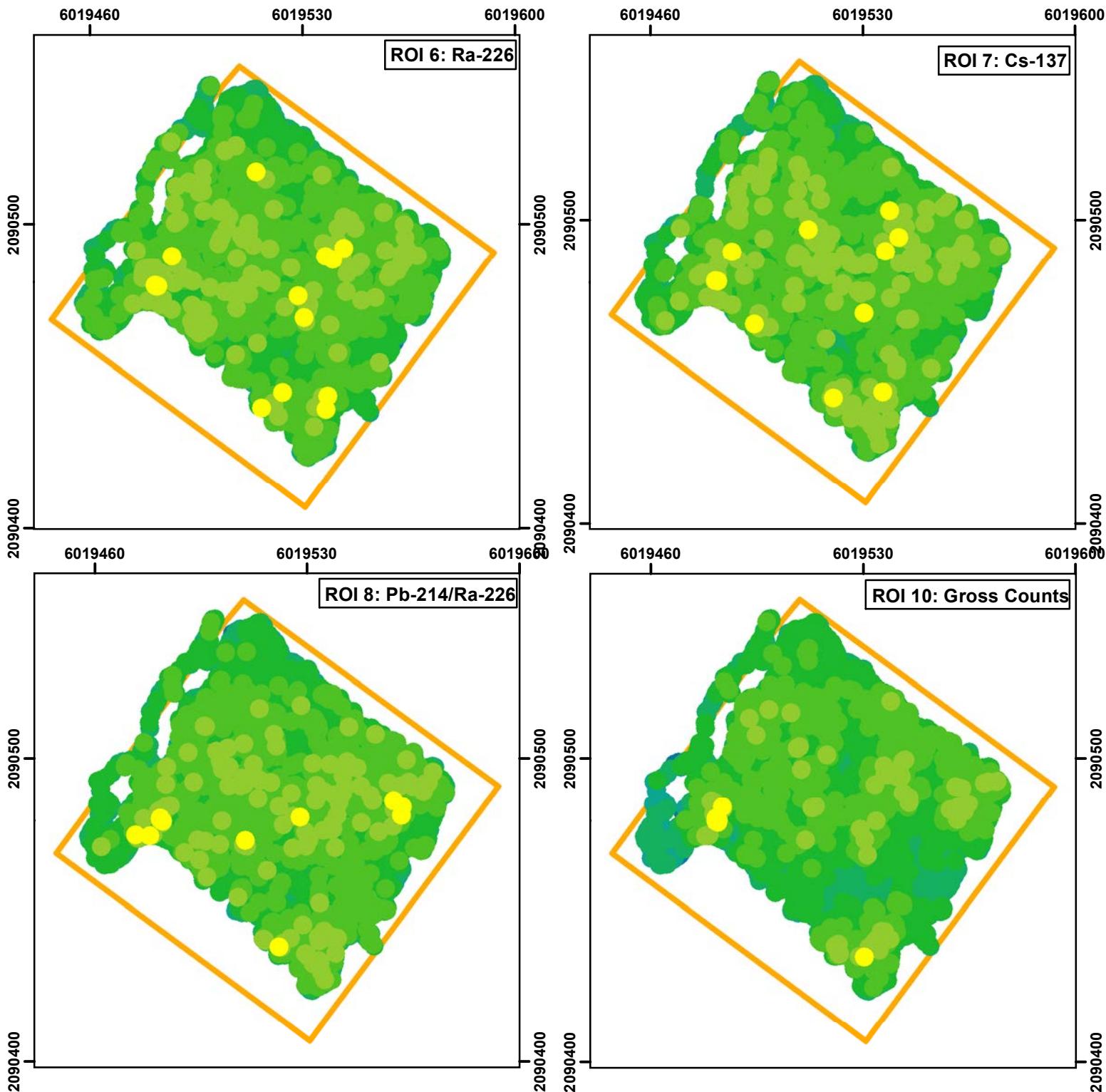
Where:

$$L_C = 2.33\sqrt{B}$$

LC	=	critical level (counts)
B	=	average background in the ROI

When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

**HPNS Parcel E-2
RSY Pad B5 (Use 8)****RS-700 Gamma Walkover Survey Data (VD1)**

- | | |
|--|-----------------------------------|
| Yellow circle: > 3 std dev | Green circle: > -1 to < 0 std dev |
| Light green circle: > 2 to < 3 std dev | Cyan circle: > -1 to < -2 std dev |
| Dark green circle: > 1 to < 2 std dev | Blue circle: > -3 to < -2 std dev |
| Dark green circle: > 0 to < 1 std dev | Dark blue circle: < -3 std dev |
- Yellow square: RSY Pad Boundaries

0 20 40 80
Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Review Summary

Summary:

14 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on gamma static data at these locations do not indicate the presence of ^{226}Ra or ^{137}Cs above background. Gamma static readings at these locations are less than the Reference Area static IL for ROIs 3, 6, 7, 8, and 10; figures are provided on pages 9-22.

RSI Follow-up Static Survey
HPRS-07062018-PE2-JSS2-2716

HPNS Parcel E-2 RSY Pad B5 (Use 8)

Soil Excavation Site:
FW-Lead Over Excavation

6019460

6019530

6019600

2090600

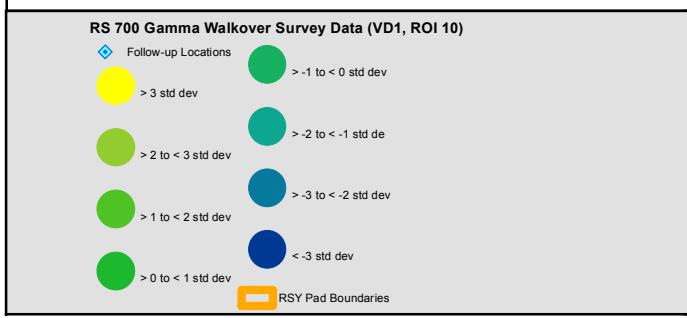
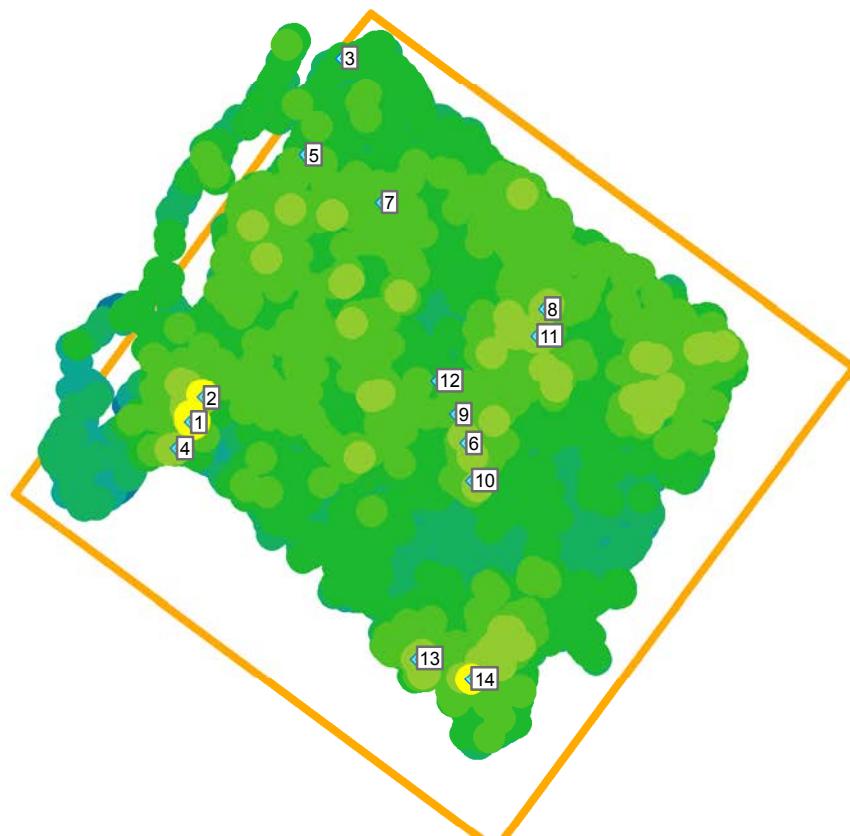
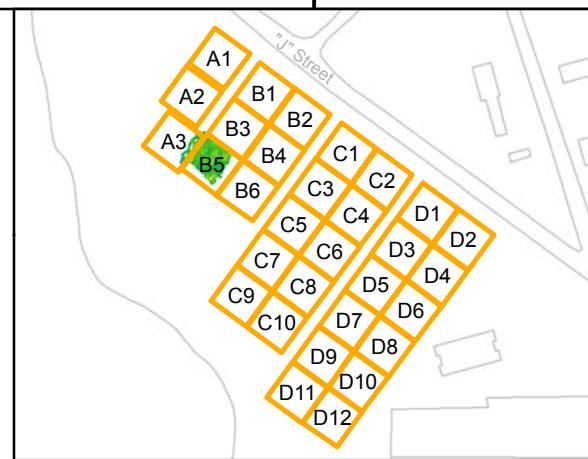
2090500

2090400

2090600

2090500

2090400



Coordinate system: CSP Zone III, NAD83, US Survey Foot

0 15 30 60 Feet



Systematic Sample Survey
HPRS-07022018-PE2-JSS-2694

HPNS Parcel E-2 RSY Pad B5 (Use 8)

Soil Excavation Site:
FW Lead Over-Excavation

6019460

6019530

6019600

2090600

2090600

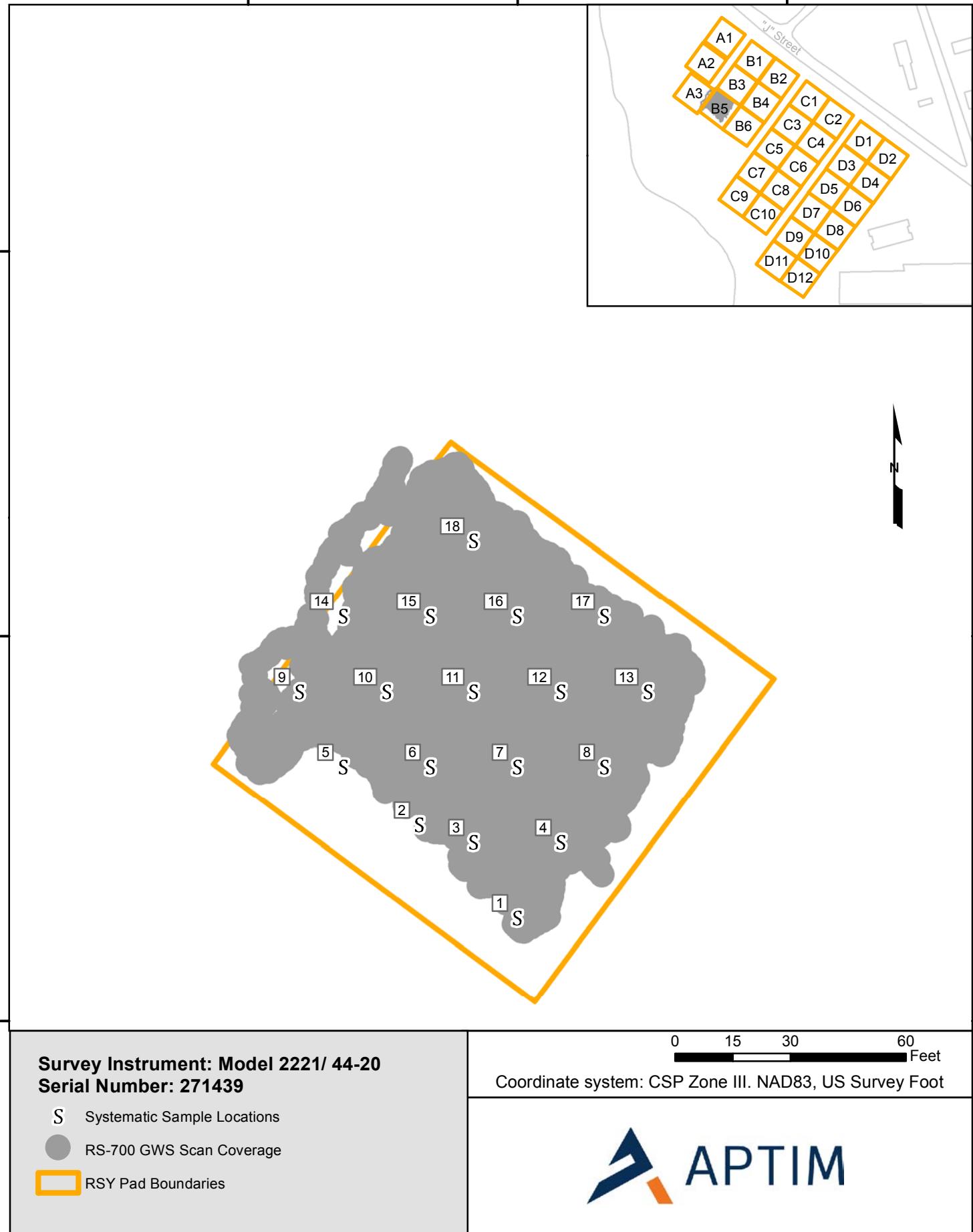
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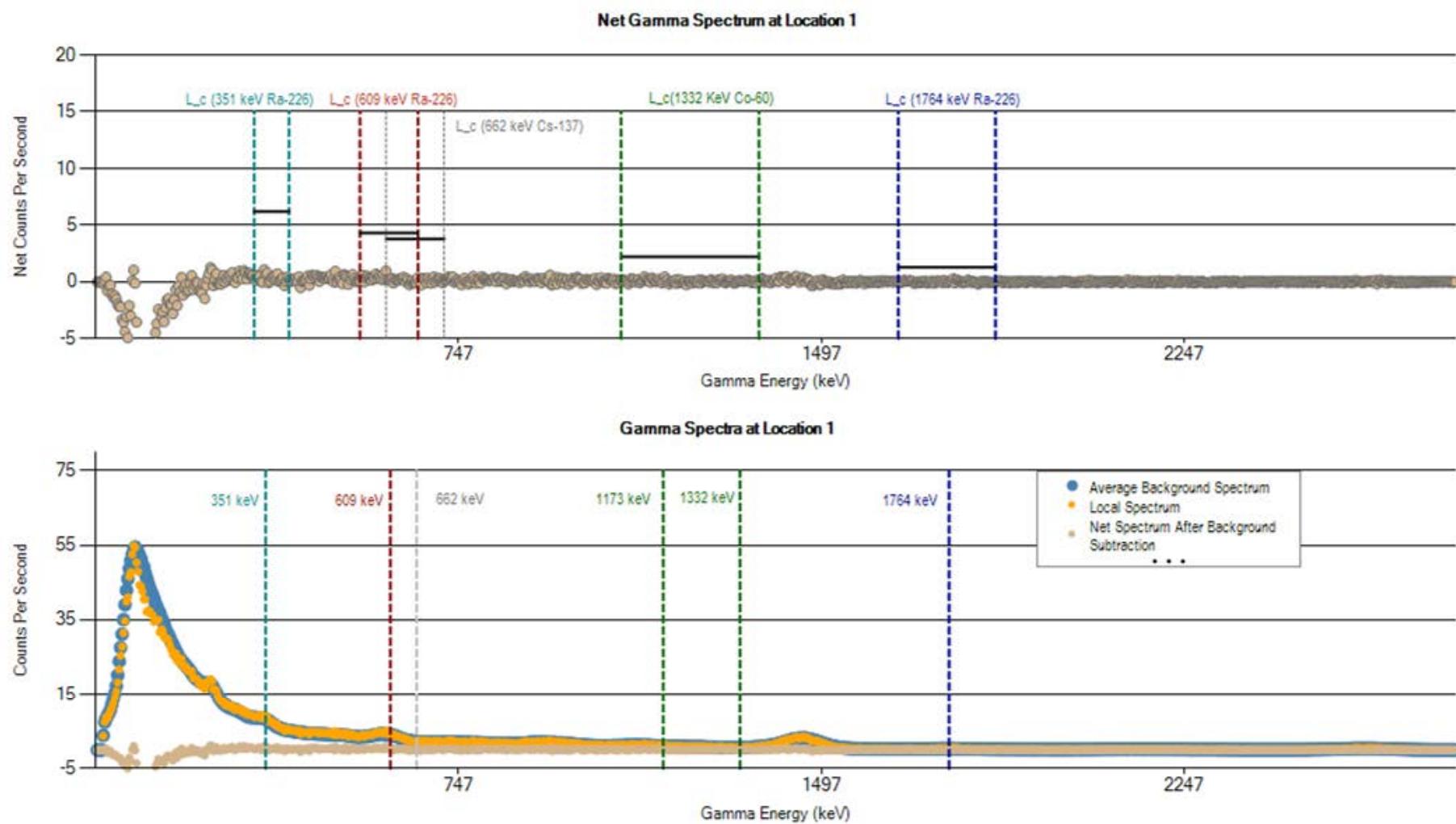
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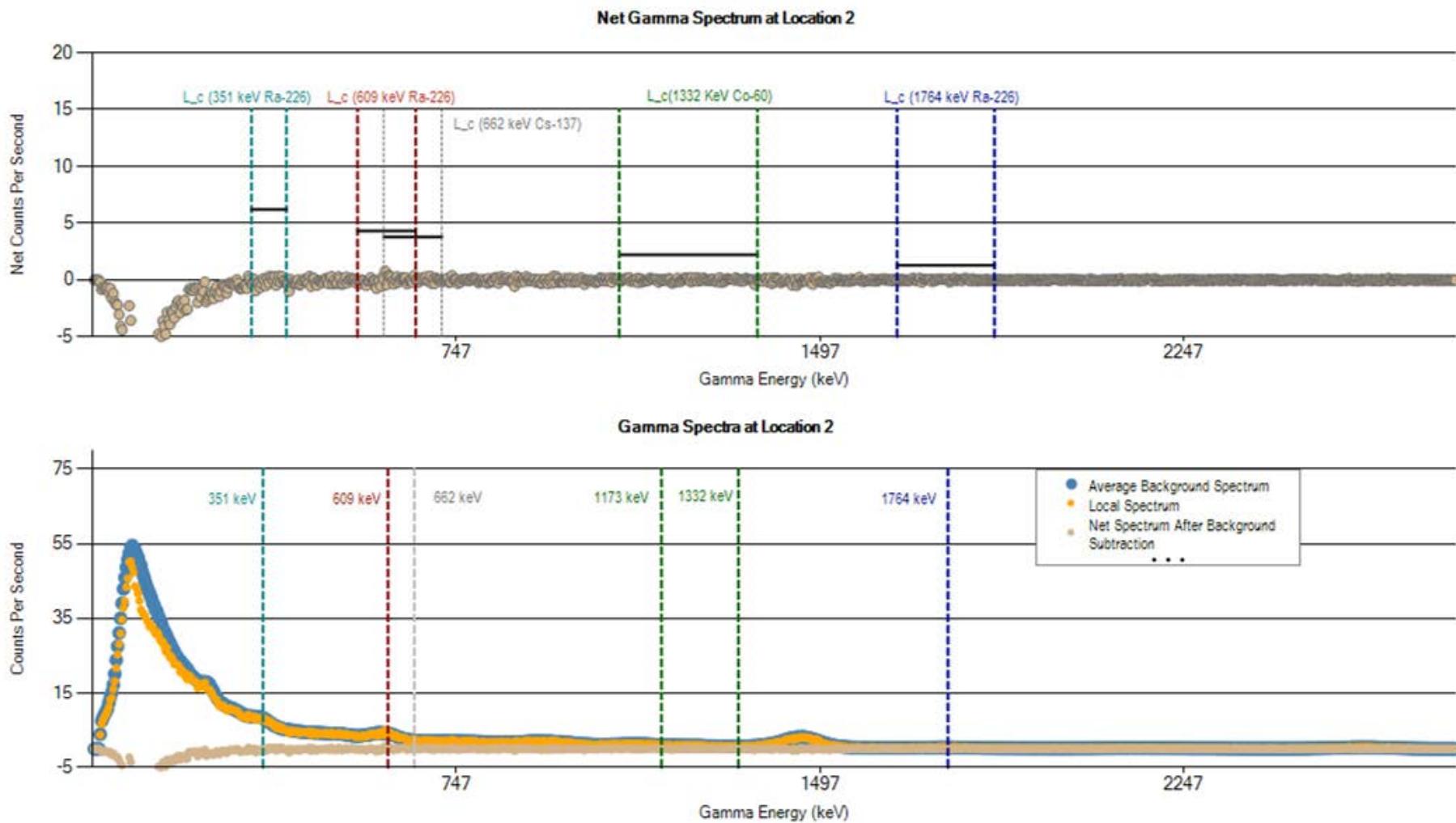
2090400

0 15 30 60 Feet

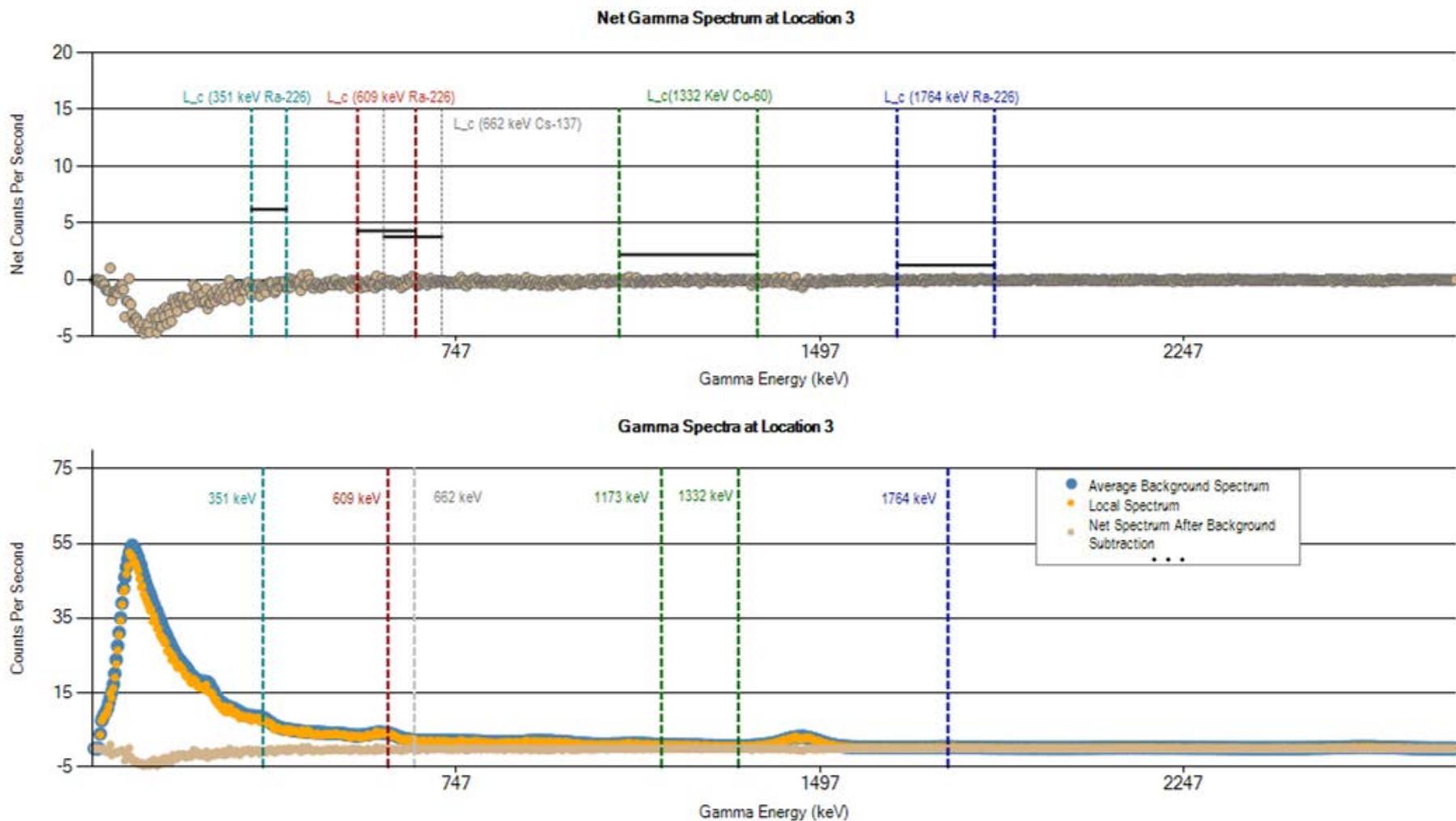




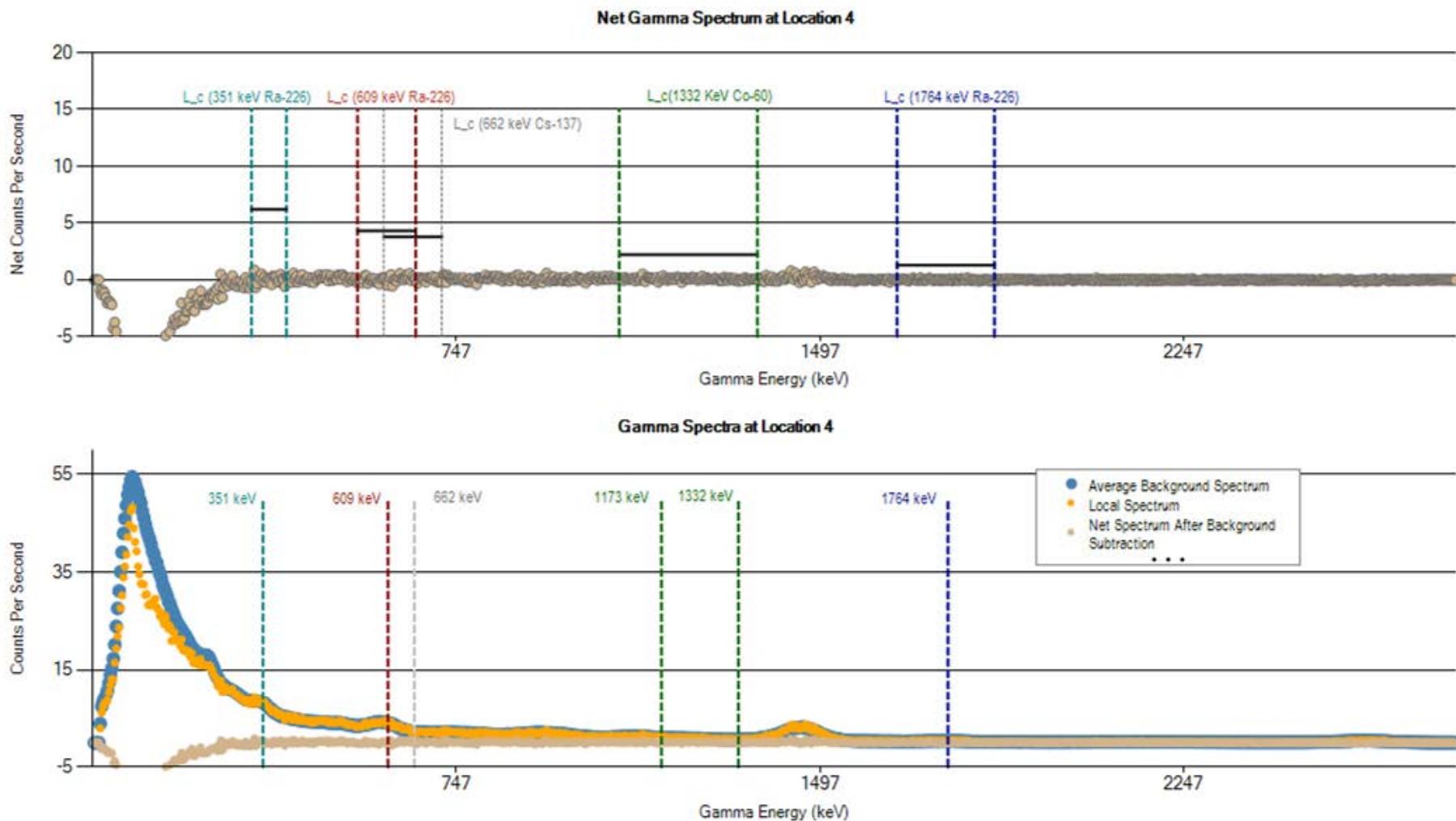
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Location 1 (cps)	909	119	21	25	163	150	113	182	95	3513
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



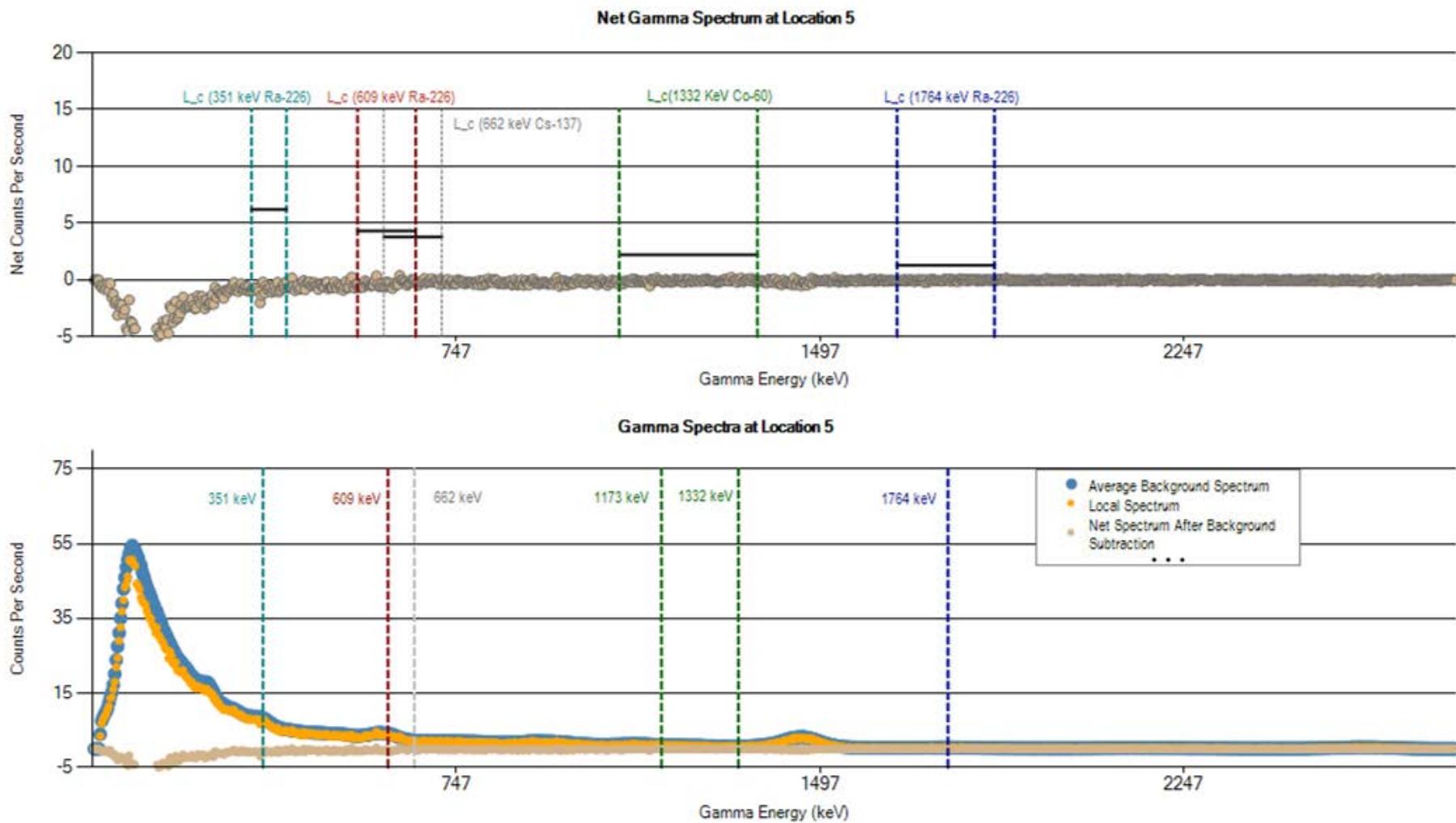
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Location 2 (cps)	842	111	21	23	148	139	109	171	89	3287
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



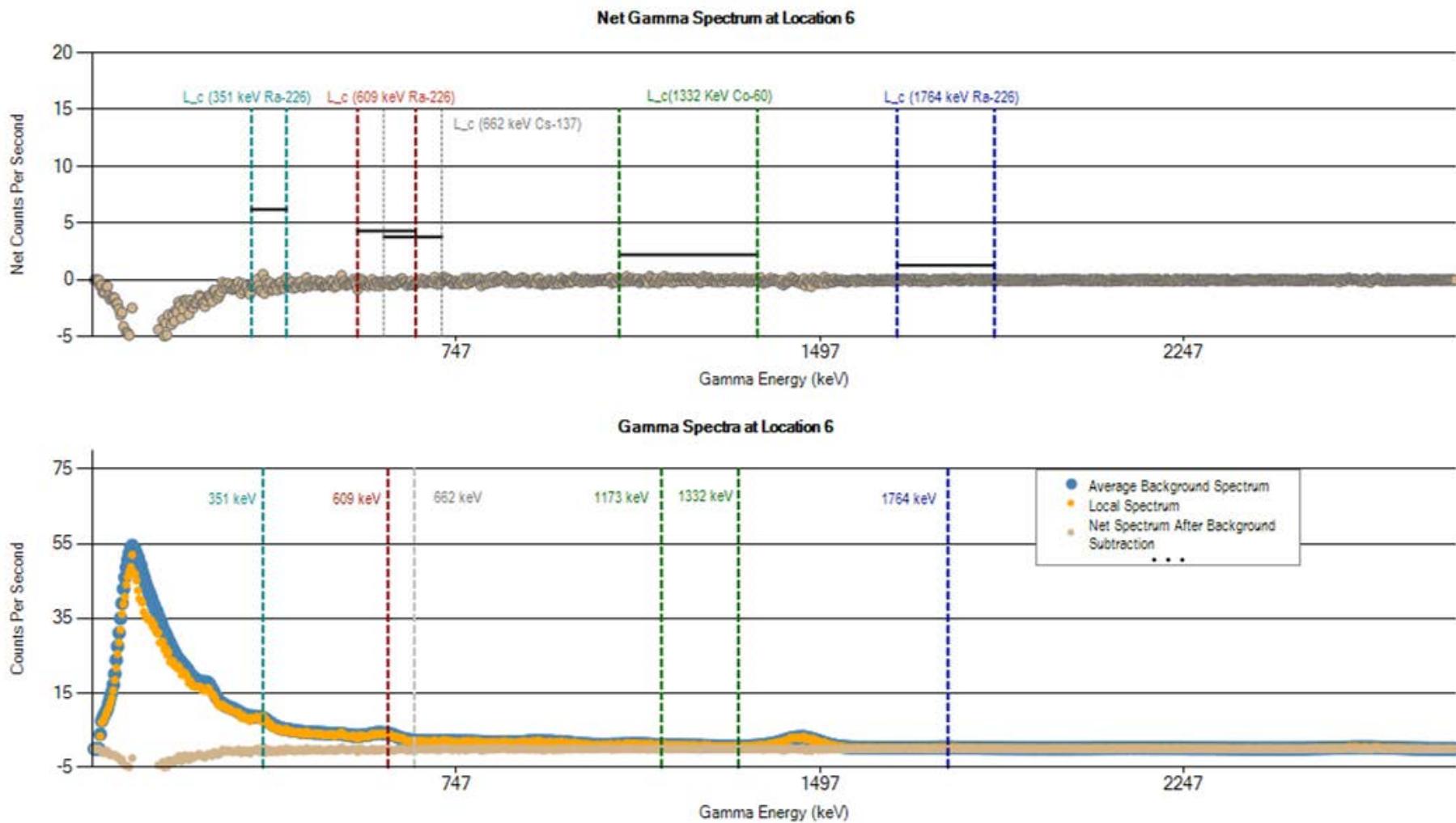
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Location 3 (cps)	778	106	19	21	137	129	99	159	82	3315
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



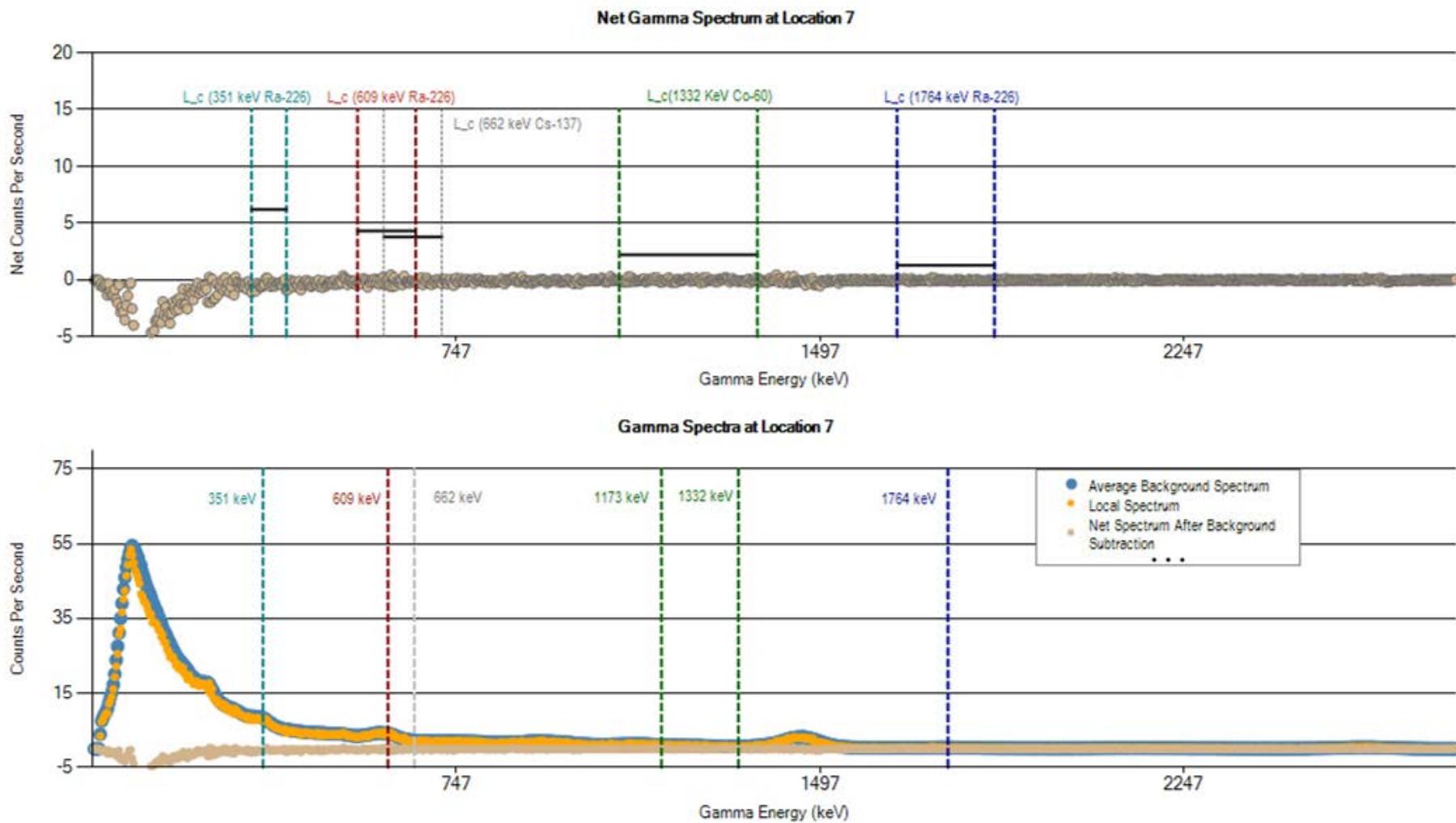
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 4 (cps)	887	124	21	22	156	142	111	175	96	3172
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



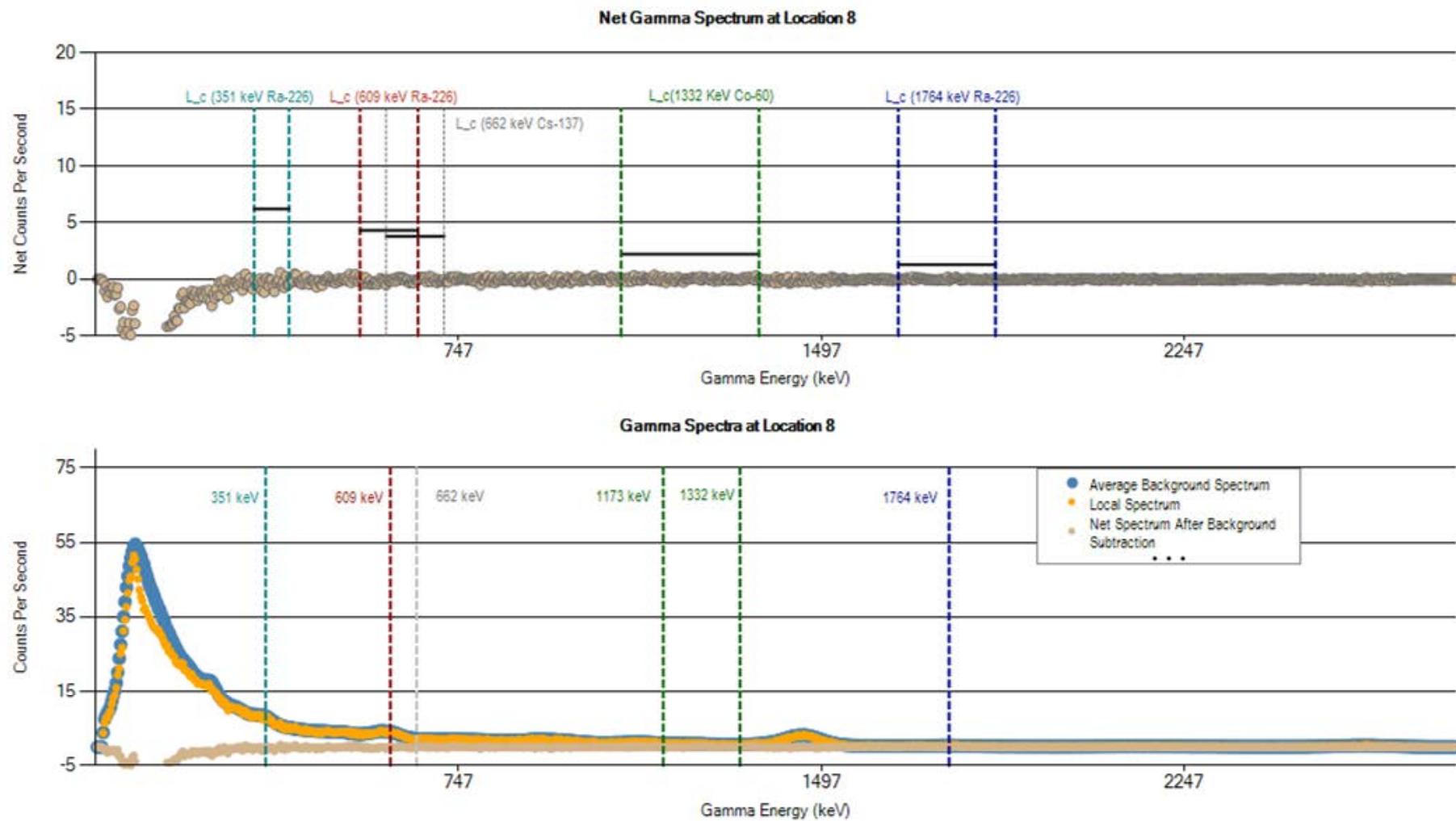
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 5 (cps)	766	106	19	20	133	127	99	155	81	3221
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



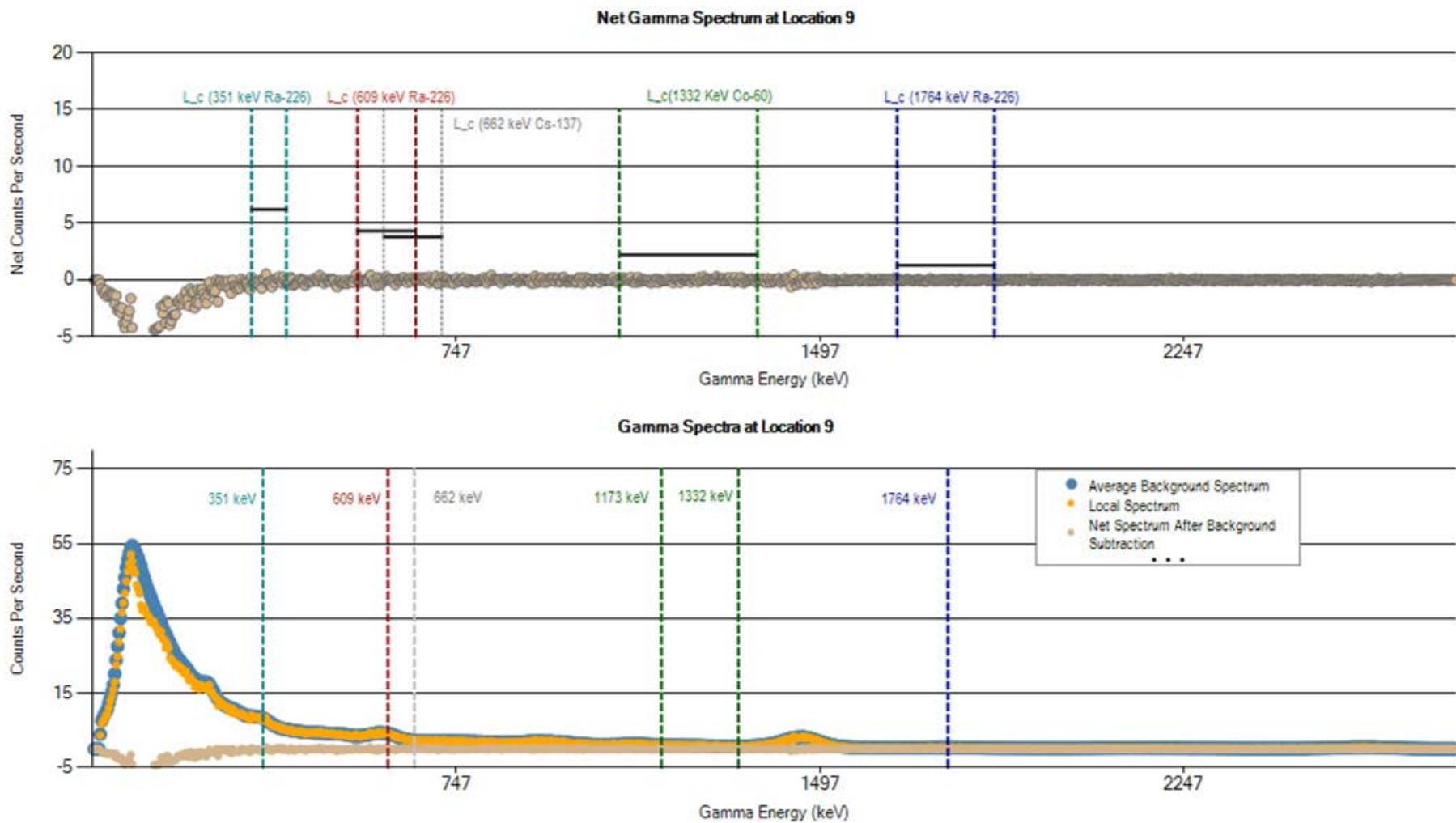
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 6 (cps)	804	108	20	22	141	130	100	162	87	3240
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



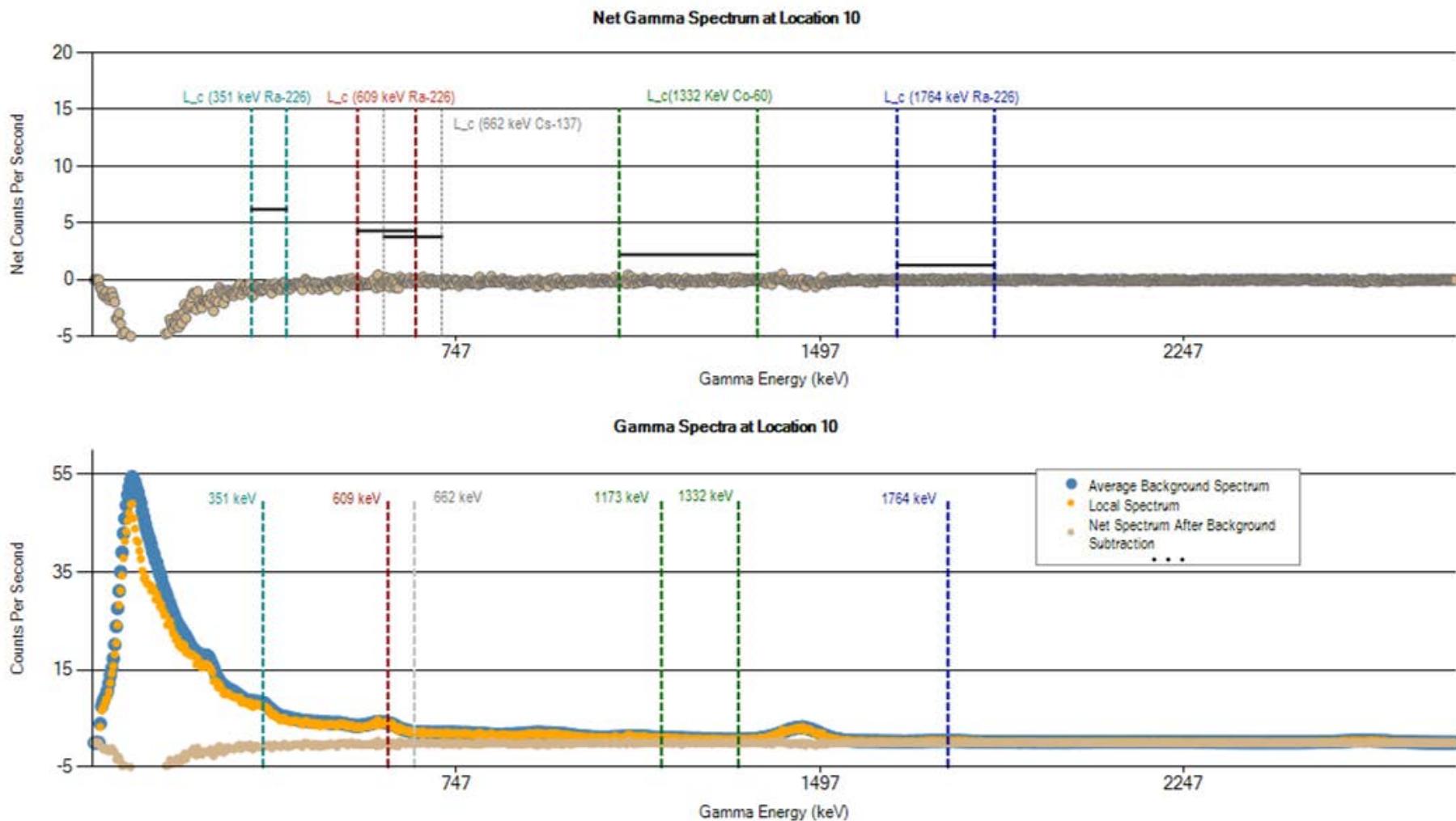
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 7 (cps)	809	109	19	22	143	133	101	164	86	3349
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



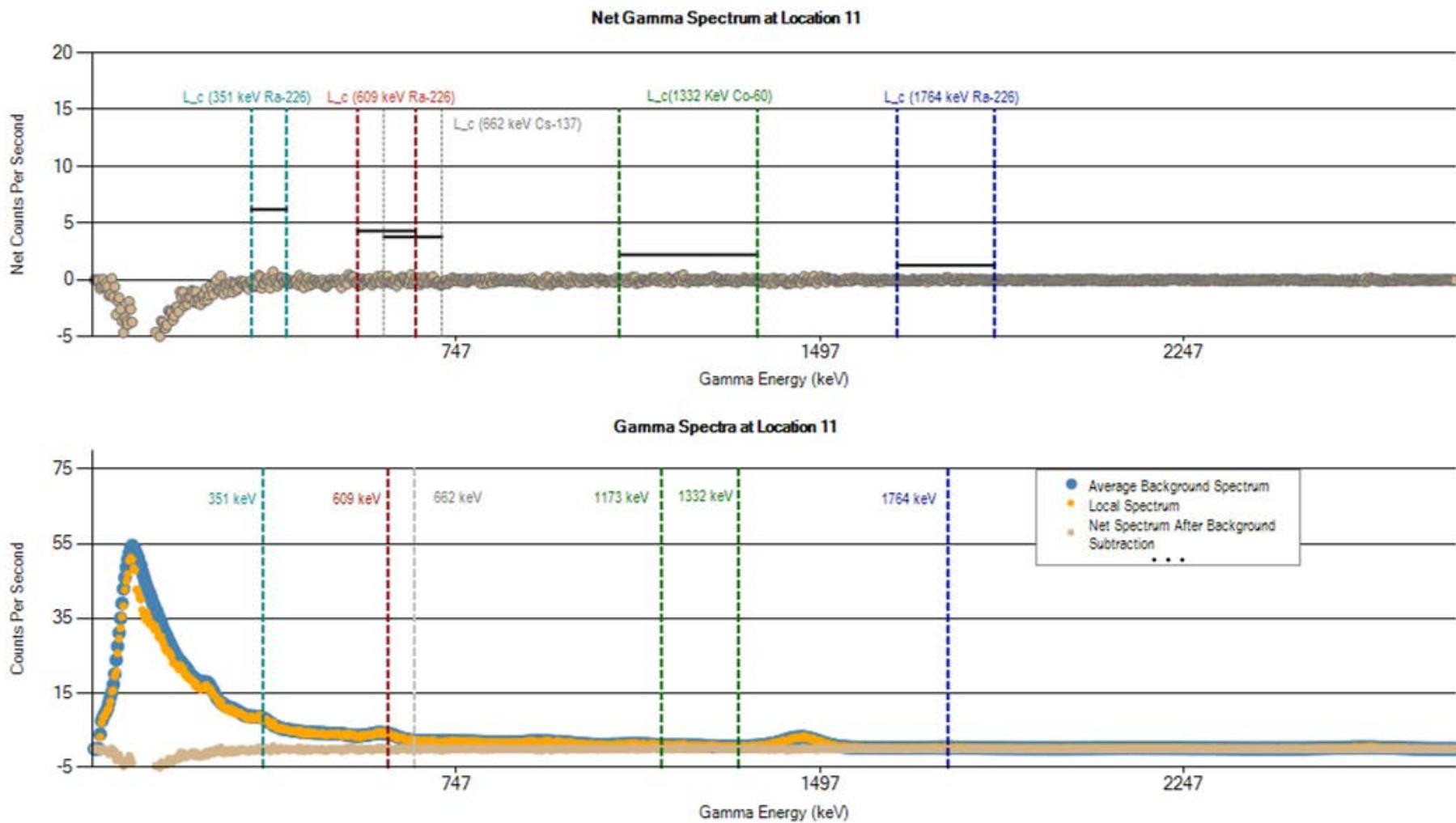
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 8 (cps)	832	110	20	22	148	135	105	167	90	3267
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



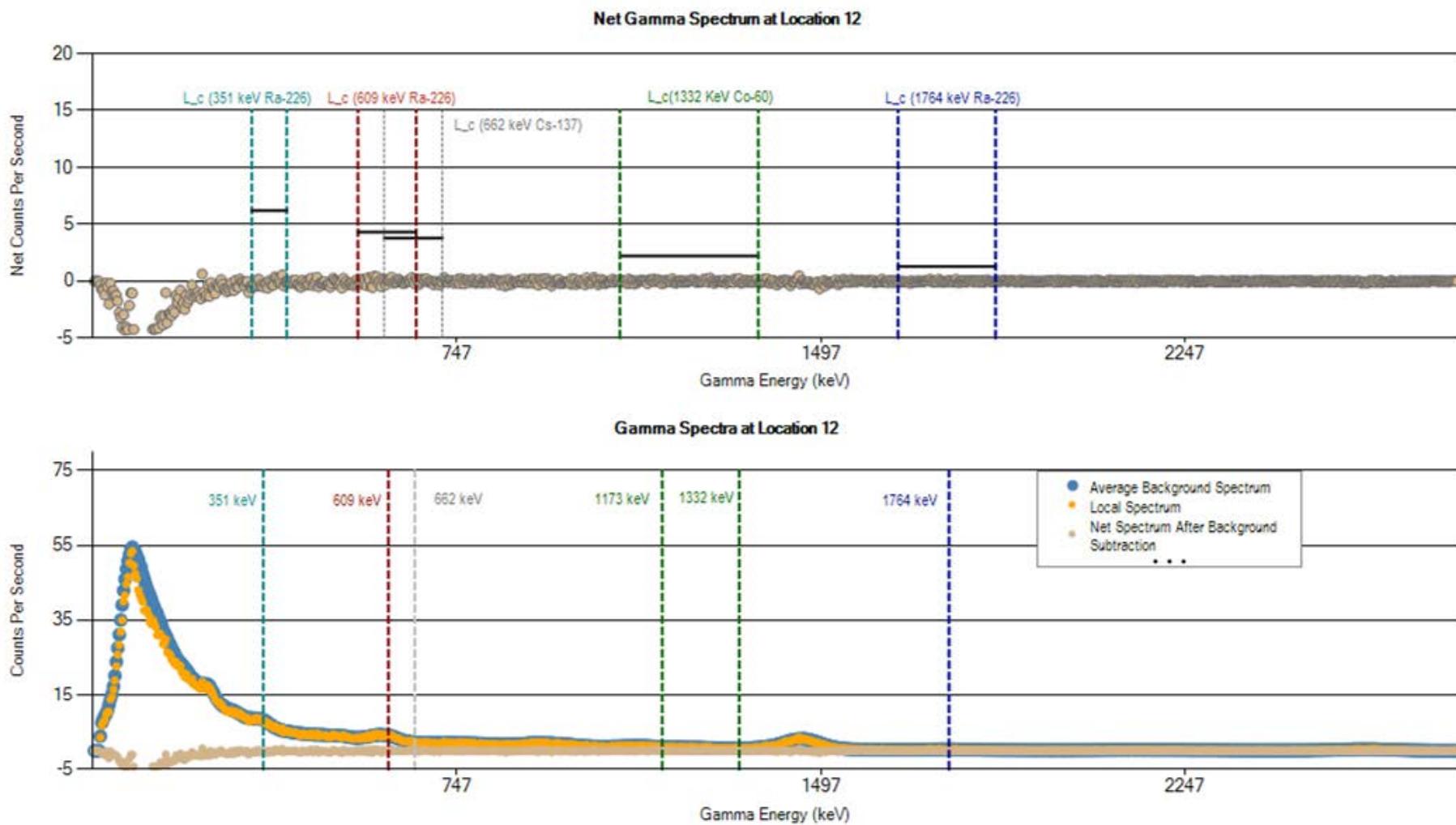
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 9 (cps)	842	112	20	23	149	139	108	171	88	3340
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



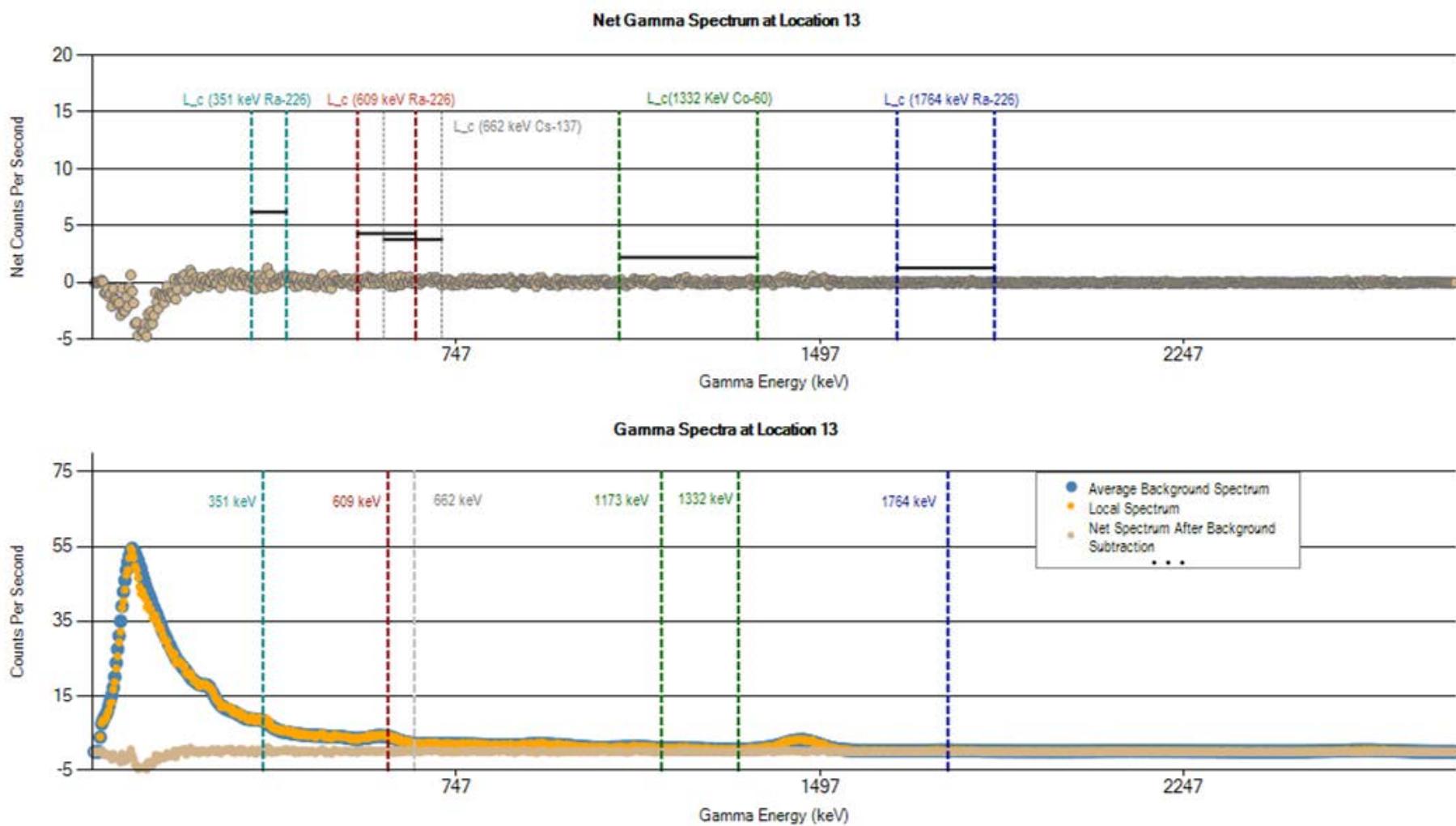
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 10 (cps)	783	107	20	20	138	131	102	157	82	3138
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



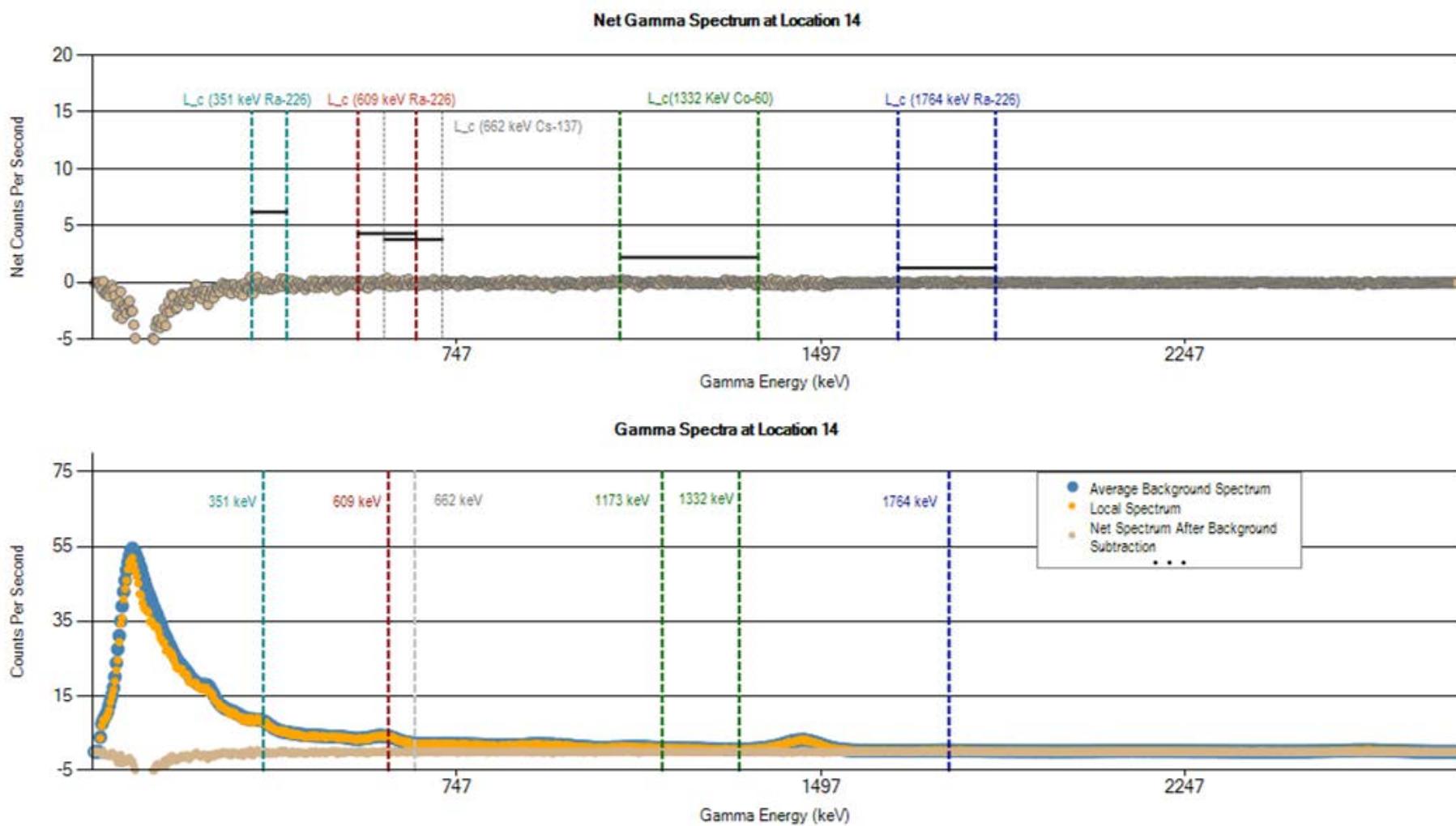
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 11 (cps)	827	112	20	22	146	137	103	171	88	3306
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 12 (cps)	833	110	20	22	146	140	107	171	88	3358
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 13 (cps)	879	122	21	23	155	145	112	180	91	3551
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 14 (cps)	826	110	20	21	147	138	106	169	88	3371
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

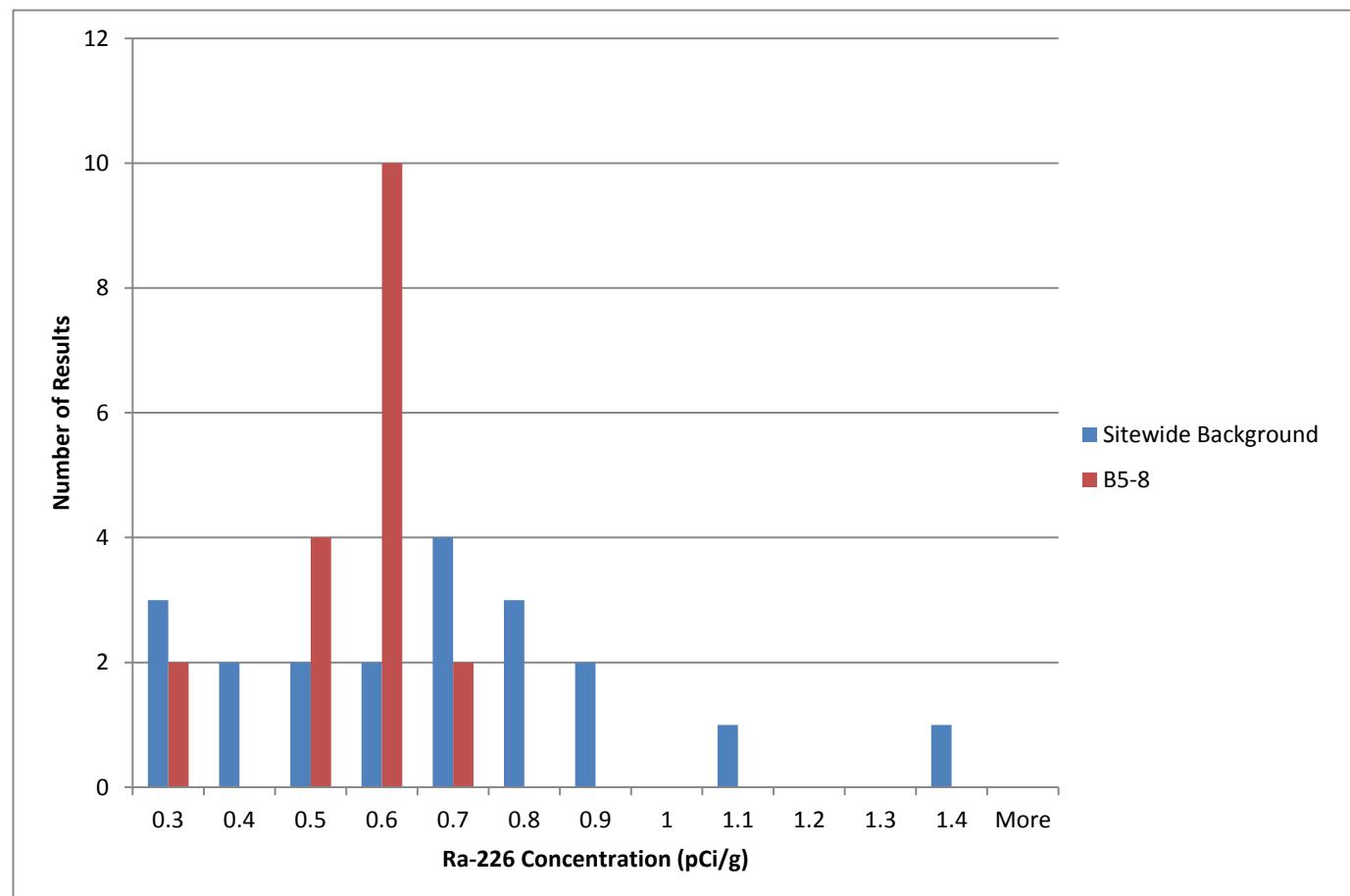
Histogram, RSY B5 (Use 8) vs. Sitewide Background

Background

Bin	Frequency
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

B5-8

Bin	Frequency
0.3	2
0.4	0
0.5	4
0.6	10
0.7	2
0.8	0
0.9	0
1	0
1.1	0
1.2	0
1.3	0
1.4	0
More	0



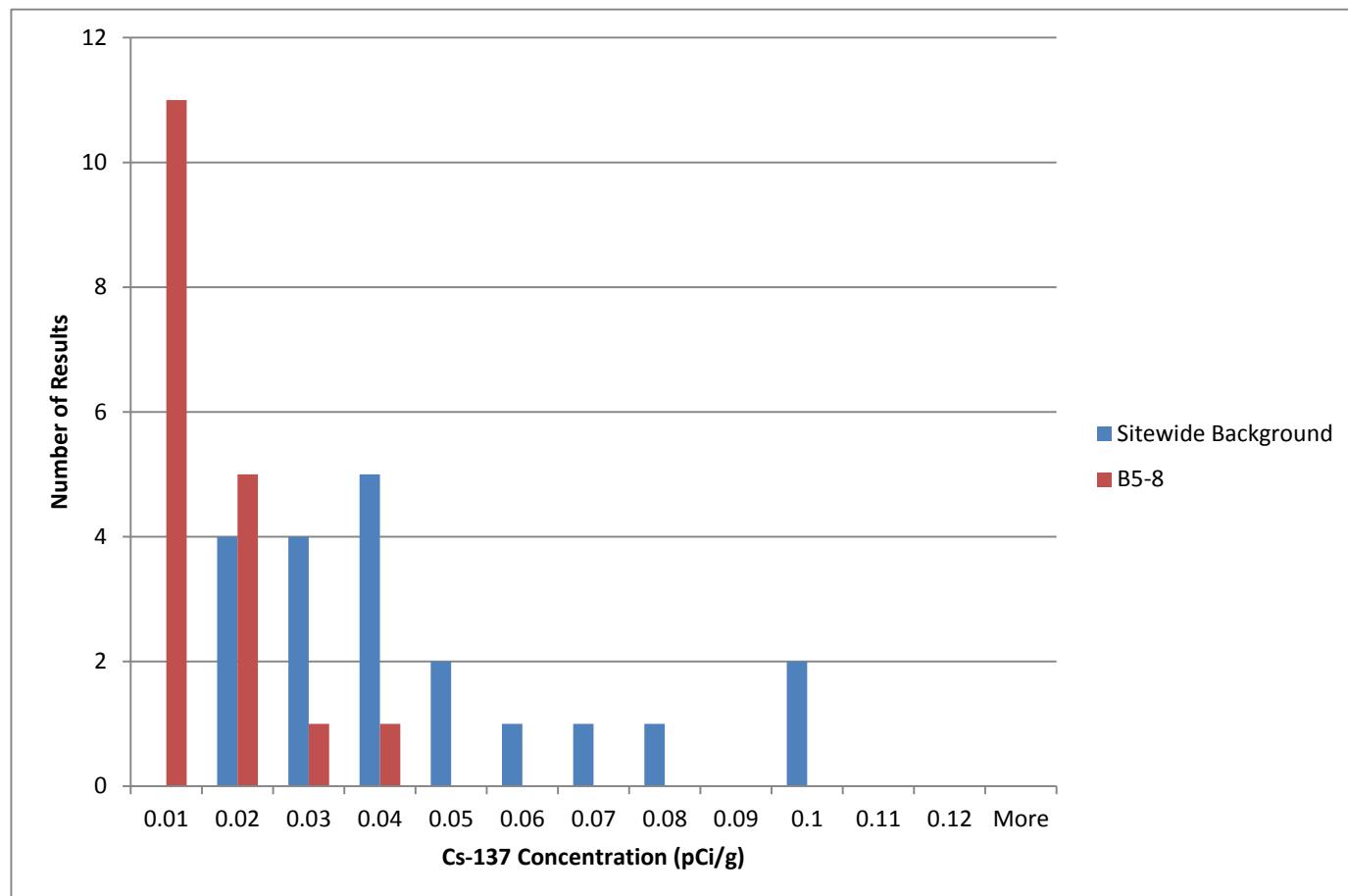
Histogram, RSY B5 (Use 8) vs. Sitewide Background

Background

Bin	Frequency
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

B5-8

Bin	Frequency
0.01	11
0.02	5
0.03	1
0.04	1
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-29324-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Rhonda Ridenhower

Authorized for release by:

8/2/2018 9:36:48 AM

Rhonda Ridenhower, Manager of Project Management
(314)298-8566

rhonda.ridenhower@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Job ID: 160-29324-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-29324-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup

Method 3630C: Silica Gel Cleanup

Method 3640A: Gel-Permeation Cleanup

Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Job ID: 160-29324-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 07/05/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 19.0 C.

TOTAL BETA STRONTIUM (GFPC)

Samples PE2-RSYB5-U8-S001 (160-29324-1) and PE2-RSYB5-U8-S011 (160-29324-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 07/05/2018, prepared on 07/06/2018 and analyzed on 07/27/2018.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:

PE2-RSYB5-U8-S001 (160-29324-1) and PE2-RSYB5-U8-S011 (160-29324-11). The samples contained detritus material and rocks of varying sizes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYB5-U8-S001 (160-29324-1), PE2-RSYB5-U8-S002 (160-29324-2), PE2-RSYB5-U8-S003 (160-29324-3), PE2-RSYB5-U8-S004 (160-29324-4), PE2-RSYB5-U8-S005 (160-29324-5), PE2-RSYB5-U8-S006 (160-29324-6), PE2-RSYB5-U8-S007 (160-29324-7), PE2-RSYB5-U8-S008 (160-29324-8), PE2-RSYB5-U8-S009 (160-29324-9), PE2-RSYB5-U8-S010 (160-29324-10), PE2-RSYB5-U8-S011 (160-29324-11), PE2-RSYB5-U8-S012 (160-29324-12), PE2-RSYB5-U8-S013 (160-29324-13), PE2-RSYB5-U8-S014 (160-29324-14), PE2-RSYB5-U8-S015 (160-29324-15), PE2-RSYB5-U8-S016 (160-29324-16), PE2-RSYB5-U8-S017 (160-29324-17) and PE2-RSYB5-U8-S018 (160-29324-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 07/05/2018, prepared on 07/08/2018 and analyzed on 07/30/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

PE2-RSYB5-U8-S008 (160-29324-8) and PE2-RSYB5-U8-S009 (160-29324-9)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for U-235: (160-29324-A-1-F DU). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Co-60: PE2-RSYB5-U8-S013 (160-29324-13). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

APTIM

CHAIN OF CUSTODY

Ref. Document # PE2_RSYB5 USE8 FWLeadOverEx#545
Page _____ of _____ 2

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 500506

CTO-013 RSYB5 USE 8 Freshwater
Wetlands Over-excavation Systematic

Project Name: HFN5 - Parcel E-2

Purchase Order #: 2022956

Shipment/Pickup Date: 7. 3. 18

Waybill Number: 12645394928900

Lab Destination: TestAmerica (St. Louis Lab)
13715 Rider Trail North

Bart City, MO 65045

Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Project Manager: Nels Johnson
(Name & phone #)

Send Report To: Eddie Kalombo

Phone/Fax Number: 415-987-0760

Address: 4005 Port Chicago Hwy

City: Concord, CA, 94520

Sampler's Name(s): Eddie Kalombo		Collection Information		
Sample ID Number	Sample Description	Date	Time	Method
PE2-RSYB5-U8-S001	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0843	G
PE2-RSYB5-U8-S002	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0847	G
PE2-RSYB5-U8-S003	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0850	G
PE2-RSYB5-U8-S004	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0854	G
PE2-RSYB5-U8-S005	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0858	G
PE2-RSYB5-U8-S006	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0902	G
PE2-RSYB5-U8-S007	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0906	G
PE2-RSYB5-U8-S008	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0910	G
PE2-RSYB5-U8-S009	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0914	G
PE2-RSYB5-U8-S010	Parcel E-2 RSYB5 USE 8 Systematic	7/2/18	0918	G

Special Instructions:

Level Of QC Required:		Project Specific:		
<input type="checkbox"/> 24-hr	<input type="checkbox"/> 3-day	<input type="checkbox"/> 10-day	I	II
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1	III
Received By: <i>Eddie Kalombo</i>	Date: 7/2/18 Time: 1100	Received By: <i>Eddie Kalombo</i>	Date: 7/2/18 Time: 1100	Method Codes: C = Composite G = Grab
Reissued By: <i>Eddie Kalombo</i>	Date: 7/3/18 Time: 1600	Received By: <i>Eddie Kalombo</i>	Date: 7/3/18 Time: 1600	Matrix Codes: DW = Drinking Water GW = Ground Water WW = Waste Water A = Air
Reissued By: <i>Eddie Kalombo</i>	Date: _____ Time: _____	Received By: <i>Eddie Kalombo</i>	Date: _____ Time: _____	SO = Soil SL = Sludge CP = Chip Samples AS = Asbestos, PO = Pipe Opening

Analyze for Total Strontium as a screening step, and Isotopic Sr-87 only if Total Strontium is above project action limit of 0.331 pCi/g.

160-29324 Chain of Custody



Analyses Requested		Total Strontium (EPA 905 MOD)		Strontium 90 (EPA 905 MOD)	
Gamma Spec (EPA 1911 M) - (7 day le-growth preliminary results and full 21 day full gamma results)	N/A	N/A	N/A	N/A	N/A

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Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-29324-2

Login Number: 29324**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation

These commonly used abbreviations may or may not be present in this report.

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29324-1	PE2-RSYB5-U8-S001	Solid	07/02/18 08:43	07/05/18 08:40
160-29324-2	PE2-RSYB5-U8-S002	Solid	07/02/18 08:47	07/05/18 08:40
160-29324-3	PE2-RSYB5-U8-S003	Solid	07/02/18 08:50	07/05/18 08:40
160-29324-4	PE2-RSYB5-U8-S004	Solid	07/02/18 08:54	07/05/18 08:40
160-29324-5	PE2-RSYB5-U8-S005	Solid	07/02/18 08:58	07/05/18 08:40
160-29324-6	PE2-RSYB5-U8-S006	Solid	07/02/18 09:02	07/05/18 08:40
160-29324-7	PE2-RSYB5-U8-S007	Solid	07/02/18 09:06	07/05/18 08:40
160-29324-8	PE2-RSYB5-U8-S008	Solid	07/02/18 09:10	07/05/18 08:40
160-29324-9	PE2-RSYB5-U8-S009	Solid	07/02/18 09:14	07/05/18 08:40
160-29324-10	PE2-RSYB5-U8-S010	Solid	07/02/18 09:18	07/05/18 08:40
160-29324-11	PE2-RSYB5-U8-S011	Solid	07/02/18 09:22	07/05/18 08:40
160-29324-12	PE2-RSYB5-U8-S012	Solid	07/02/18 09:26	07/05/18 08:40
160-29324-13	PE2-RSYB5-U8-S013	Solid	07/02/18 09:30	07/05/18 08:40
160-29324-14	PE2-RSYB5-U8-S014	Solid	07/02/18 09:34	07/05/18 08:40
160-29324-15	PE2-RSYB5-U8-S015	Solid	07/02/18 09:38	07/05/18 08:40
160-29324-16	PE2-RSYB5-U8-S016	Solid	07/02/18 09:42	07/05/18 08:40
160-29324-17	PE2-RSYB5-U8-S017	Solid	07/02/18 09:46	07/05/18 08:40
160-29324-18	PE2-RSYB5-U8-S018	Solid	07/02/18 09:50	07/05/18 08:40

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S001**Lab Sample ID: 160-29324-1**

Matrix: Solid

Date Collected: 07/02/18 08:43

Date Received: 07/05/18 08:40

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.0349	U	0.0593	0.0594	0.331	0.0457	pCi/g	07/06/18 10:41	07/27/18 07:20	1
<i>Carrier</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	Dil Fac
<i>Sr Carrier</i>	91.6		40 - 110					07/06/18 10:41	07/27/18 07:20	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.704		0.219	0.231		0.0557	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Actinium-227	0.0863	U	0.175	0.175		0.468	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Bismuth-212	0.288	U	0.757	0.758		0.595	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Bismuth-214	0.535		0.127	0.138		0.0409	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Cesium-137	-0.0145	U	0.0607	0.0608	0.0700	0.0486	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Cobalt-60	-0.0522	U	0.0649	0.0651	0.200	0.0592	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Lead-210	0.837		1.11	1.12		0.753	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Lead-212	0.567		0.110	0.132		0.0568	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Lead-214	0.564		0.144	0.155		0.0579	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Potassium-40	9.60		1.49	1.78		0.244	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Protactinium-231	0.0000002	U	2.91	2.91		2.40	pCi/g	07/08/18 19:28	07/30/18 09:53	1
			21							
Radium-226	0.535		0.127	0.138	0.700	0.0409	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Radium-228	0.704		0.219	0.231		0.0557	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Thallium-208	0.253		0.0606	0.0661		0.0142	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Thorium-228	0.567		0.110	0.132		0.0568	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Thorium-232	0.704		0.219	0.231		0.0557	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Thorium-234	0.553	U	0.908	0.910		0.633	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Uranium-235	0.0756	U	0.174	0.174		0.305	pCi/g	07/08/18 19:28	07/30/18 09:53	1
Uranium-238	0.553	U	0.908	0.910		0.633	pCi/g	07/08/18 19:28	07/30/18 09:53	1

Client Sample ID: PE2-RSYB5-U8-S002**Lab Sample ID: 160-29324-2**

Matrix: Solid

Date Collected: 07/02/18 08:47

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.767		0.189	0.204		0.0459	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Actinium-227	0.0664	U	0.330	0.330		0.441	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Bismuth-212	1.21		0.543	0.558		0.203	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Bismuth-214	0.588		0.130	0.144		0.0414	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Cesium-137	0.0189	U	0.0475	0.0476	0.0700	0.0369	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Cobalt-60	0.00436	U	0.0146	0.0146	0.200	0.0355	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Lead-210	0.763	U	1.30	1.30		0.870	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Lead-212	0.563		0.101	0.124		0.0463	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Lead-214	0.616		0.132	0.147		0.0561	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Potassium-40	9.92		1.42	1.74		0.309	pCi/g	07/08/18 19:28	07/30/18 09:54	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S002

Date Collected: 07/02/18 08:47

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-2

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-231	0.581	U	1.86	1.86		2.02	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Radium-226	0.588		0.130	0.144	0.700	0.0414	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Radium-228	0.767		0.189	0.204		0.0459	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Thallium-208	0.193		0.0556	0.0591		0.0198	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Thorium-228	0.563		0.101	0.124		0.0463	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Thorium-232	0.767		0.189	0.204		0.0459	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Thorium-234	1.13		1.10	1.11		0.741	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Uranium-235	0.0718	U	0.162	0.162		0.323	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Uranium-238	1.13		1.10	1.11		0.741	pCi/g	07/08/18 19:28	07/30/18 09:54	1

Client Sample ID: PE2-RSYB5-U8-S003

Date Collected: 07/02/18 08:50

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-3

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.877		0.218	0.235		0.0359	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Actinium-227	0.347	U	0.573	0.575		0.748	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Bismuth-212	0.456	U	0.850	0.851		0.654	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Bismuth-214	0.644		0.169	0.181		0.0618	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Cesium-137	-0.0470	U	0.0809	0.0810	0.0700	0.0625	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Cobalt-60	0.00398	U	0.0948	0.0948	0.200	0.0468	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Lead-210	1.65		1.55	1.56		1.17	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Lead-212	0.495		0.120	0.131		0.0688	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Lead-214	0.520		0.125	0.136		0.0497	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Potassium-40	10.4		1.66	1.96		0.399	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Protactinium-231	-1.11	U	3.58	3.58		2.91	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Radium-226	0.644		0.169	0.181	0.700	0.0618	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Radium-228	0.877		0.218	0.235		0.0359	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Thallium-208	0.177		0.112	0.113		0.0521	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Thorium-228	0.495		0.120	0.131		0.0688	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Thorium-232	0.877		0.218	0.235		0.0359	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Thorium-234	-0.121	U	1.46	1.46		1.20	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Uranium-235	0.136	U	0.335	0.335		0.498	pCi/g	07/08/18 19:28	07/30/18 09:54	1
Uranium-238	-0.121	U	1.46	1.46		1.20	pCi/g	07/08/18 19:28	07/30/18 09:54	1

Client Sample ID: PE2-RSYB5-U8-S004

Date Collected: 07/02/18 08:54

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-4

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.679		0.196	0.208		0.0338	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Actinium-227	0.289	U	0.510	0.511		0.616	pCi/g	07/08/18 19:28	07/30/18 09:56	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S004

Date Collected: 07/02/18 08:54

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-4

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.0589	U	0.880	0.880		0.739	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Bismuth-214	0.553		0.129	0.141		0.0282	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Cesium-137	-0.0251	U	0.0733	0.0734	0.0700	0.0575	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Cobalt-60	0.0245	U	0.0542	0.0543	0.200	0.0385	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Lead-210	-0.980	U	1.47	1.47		1.60	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Lead-212	0.647		0.106	0.135		0.0426	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Lead-214	0.571		0.130	0.143		0.0641	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Potassium-40	9.02		1.49	1.76		0.254	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Protactinium-231	0.000	U	0.804	0.804		2.46	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Radium-226	0.553		0.129	0.141	0.700	0.0282	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Radium-228	0.679		0.196	0.208		0.0338	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Thallium-208	0.157		0.0710	0.0729		0.0323	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Thorium-228	0.647		0.106	0.135		0.0426	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Thorium-232	0.679		0.196	0.208		0.0338	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Thorium-234	0.421	U	0.403	0.405		0.732	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Uranium-235	-0.0545	U	0.185	0.185		0.411	pCi/g	07/08/18 19:28	07/30/18 09:56	1
Uranium-238	0.421	U	0.403	0.405		0.732	pCi/g	07/08/18 19:28	07/30/18 09:56	1

Client Sample ID: PE2-RSYB5-U8-S005

Date Collected: 07/02/18 08:58

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-5

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.621		0.160	0.172		0.0270	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Actinium-227	0.222	U	0.554	0.554		0.445	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Bismuth-212	0.279	U	0.699	0.700		0.552	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Bismuth-214	0.453		0.112	0.121		0.0270	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Cesium-137	0.00274	U	0.0507	0.0507	0.0700	0.0415	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Cobalt-60	0.0309		0.0293	0.0295	0.200	0.0111	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Lead-210	0.0742	U	1.09	1.09		0.890	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Lead-212	0.350		0.0810	0.0928		0.0462	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Lead-214	0.462		0.116	0.125		0.0493	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Potassium-40	9.74		1.40	1.72		0.213	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Protactinium-231	0.293	U	2.12	2.12		1.74	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Radium-226	0.453		0.112	0.121	0.700	0.0270	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Radium-228	0.621		0.160	0.172		0.0270	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Thallium-208	0.197		0.0764	0.0791		0.0338	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Thorium-228	0.350		0.0810	0.0928		0.0462	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Thorium-232	0.621		0.160	0.172		0.0270	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Thorium-234	-0.186	U	0.925	0.925		0.767	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Uranium-235	0.119	U	0.253	0.254		0.241	pCi/g	07/08/18 19:28	07/30/18 09:57	1
Uranium-238	-0.186	U	0.925	0.925		0.767	pCi/g	07/08/18 19:28	07/30/18 09:57	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S006

Date Collected: 07/02/18 09:02

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-6

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.770		0.295	0.305		0.0981	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Actinium-227	-0.329	U	0.782	0.783		0.519	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Bismuth-212	0.000	U	0.524	0.524		0.885	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Bismuth-214	0.323		0.162	0.166		0.197	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Cesium-137	0.0152	U	0.0775	0.0775	0.0700	0.0618	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Cobalt-60	0.0302	U	0.114	0.114	0.200	0.0566	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Lead-210	-0.106	U	1.66	1.66		1.17	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Lead-212	0.653		0.116	0.143		0.0438	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Lead-214	0.616		0.163	0.175		0.0647	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Potassium-40	10.4		1.81	2.10		0.324	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Protactinium-231	0.398	U	1.64	1.64		2.56	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Radium-226	0.323		0.162	0.166	0.700	0.197	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Radium-228	0.770		0.295	0.305		0.0981	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Thallium-208	0.211		0.0659	0.0695		0.0175	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Thorium-228	0.653		0.116	0.143		0.0438	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Thorium-232	0.770		0.295	0.305		0.0981	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Thorium-234	0.0338	U	1.20	1.20		0.986	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Uranium-235	0.135	U	0.403	0.403		0.325	pCi/g	07/08/18 19:28	07/30/18 09:58	1
Uranium-238	0.0338	U	1.20	1.20		0.986	pCi/g	07/08/18 19:28	07/30/18 09:58	1

Client Sample ID: PE2-RSYB5-U8-S007

Date Collected: 07/02/18 09:06

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-7

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.930		0.231	0.249		0.0702	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Actinium-227	-0.349	U	0.993	0.994		0.805	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Bismuth-212	0.401	U	0.766	0.767		0.592	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Bismuth-214	0.556		0.149	0.160		0.0593	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Cesium-137	-0.0255	U	0.0760	0.0760	0.0700	0.0605	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Cobalt-60	0.0674		0.0374	0.0380	0.200	0.0121	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Lead-210	2.03		1.76	1.78		1.08	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Lead-212	0.690		0.119	0.139		0.0568	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Lead-214	0.693		0.144	0.160		0.0505	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Potassium-40	11.5		1.55	1.94		0.122	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Protactinium-231	0.872	U	2.33	2.33		2.55	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Radium-226	0.556		0.149	0.160	0.700	0.0593	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Radium-228	0.930		0.231	0.249		0.0702	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Thallium-208	0.230		0.0796	0.0830		0.0298	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Thorium-228	0.690		0.119	0.139		0.0568	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Thorium-232	0.930		0.231	0.249		0.0702	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Thorium-234	0.541	U	1.06	1.06		0.838	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Uranium-235	-0.0450	U	0.381	0.381		0.451	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Uranium-238	0.541	U	1.06	1.06		0.838	pCi/g	07/08/18 19:28	07/30/18 10:37	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S008

Date Collected: 07/02/18 09:10

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-8

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.793		0.210	0.225		0.0303	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Actinium-227	-0.0633	U	0.582	0.582		0.412	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Bismuth-212	0.271	U	0.591	0.591		0.453	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Bismuth-214	0.575		0.140	0.152		0.0467	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Cesium-137	-0.0553	U	0.0956	0.0957	0.0700	0.0754	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Cobalt-60	0.0325		0.0604	0.0605	0.200	0.0283	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-210	-0.883	U	1.23	1.23		1.11	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-212	0.0225	U	0.167	0.167		0.137	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-214	0.547		0.124	0.137		0.0660	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Potassium-40	8.36		1.35	1.60		0.230	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Protactinium-231	0.000	U	0.885	0.885		1.99	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Radium-226	0.575		0.140	0.152	0.700	0.0467	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Radium-228	0.793		0.210	0.225		0.0303	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thallium-208	0.239		0.0825	0.0861		0.0315	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-228	0.0225	U	0.167	0.167		0.137	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-232	0.793		0.210	0.225		0.0303	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-234	0.753		0.846	0.849		0.645	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Uranium-235	-0.0423	U	0.246	0.246		0.272	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Uranium-238	0.753		0.846	0.849		0.645	pCi/g	07/08/18 19:28	07/30/18 10:36	1

Client Sample ID: PE2-RSYB5-U8-S009

Date Collected: 07/02/18 09:14

Date Received: 07/05/18 08:40

Lab Sample ID: 160-29324-9

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.694		0.165	0.180		0.0886	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Actinium-227	0.216	U	0.413	0.414		0.433	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Bismuth-212	0.818		0.428	0.436		0.146	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Bismuth-214	0.647		0.149	0.163		0.0537	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Cesium-137	-0.0239	U	0.0495	0.0496	0.0700	0.0704	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Cobalt-60	0.0122	U	0.0505	0.0505	0.200	0.0247	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-210	1.47		1.26	1.27		0.815	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-212	0.574		0.103	0.127		0.0502	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-214	0.621		0.137	0.151		0.0541	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Potassium-40	8.60		1.31	1.58		0.304	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Protactinium-231	0.000	U	0.826	0.826		2.13	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Radium-226	0.647		0.149	0.163	0.700	0.0537	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Radium-228	0.694		0.165	0.180		0.0886	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thallium-208	0.203		0.0591	0.0627		0.0210	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-228	0.574		0.103	0.127		0.0502	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-232	0.694		0.165	0.180		0.0886	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-234	1.53		1.17	1.18		0.759	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Uranium-235	0.0568	U	0.130	0.130		0.302	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Uranium-238	1.53		1.17	1.18		0.759	pCi/g	07/08/18 19:28	07/30/18 10:36	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S010**Lab Sample ID: 160-29324-10**

Matrix: Solid

Date Collected: 07/02/18 09:18

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.773		0.266	0.277		0.168	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Actinium-227	-0.480	U		1.22	1.22	0.989	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Bismuth-212	0.514	U	0.961	0.962		0.744	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Bismuth-214	0.714		0.188	0.202		0.0694	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Cesium-137	-0.0231	U	0.0830	0.0830	0.0700	0.0663	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Cobalt-60	0.0997		0.0499	0.0508	0.200	0.0145	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-210	2.63		2.00	2.02		1.20	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-212	0.504		0.117	0.128		0.0625	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Lead-214	0.668		0.134	0.150		0.0677	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Potassium-40	9.80		1.65	1.93		0.417	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Protactinium-231	0.425	U		1.79	1.79	2.81	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Radium-226	0.714		0.188	0.202	0.700	0.0694	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Radium-228	0.773		0.266	0.277		0.168	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thallium-208	0.246		0.0682	0.0727		0.0160	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-228	0.504		0.117	0.128		0.0625	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-232	0.773		0.266	0.277		0.168	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Thorium-234	-0.878	U		1.47	1.47	1.63	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Uranium-235	0.112	U	0.258	0.258		0.533	pCi/g	07/08/18 19:28	07/30/18 10:36	1
Uranium-238	-0.878	U		1.47		1.63	pCi/g	07/08/18 19:28	07/30/18 10:36	1

Client Sample ID: PE2-RSYB5-U8-S011**Lab Sample ID: 160-29324-11**

Matrix: Solid

Date Collected: 07/02/18 09:22

Date Received: 07/05/18 08:40

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.00118	U	0.0527	0.0527	0.331	0.0432	pCi/g	07/06/18 10:41	07/27/18 07:20	1
Carrier	%Yield	Qualifier	Limits							
Sr Carrier	93.6		40 - 110							
							Prepared		Analyzed	Dil Fac
							07/06/18 10:41		07/27/18 07:20	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.526		0.223	0.230		0.0749	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Actinium-227	-0.396	U	0.837	0.838		0.672	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Bismuth-212	-0.352	U	0.829	0.829		0.665	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Bismuth-214	0.494		0.143	0.152		0.0519	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Cesium-137	0.00913	U	0.0669	0.0669	0.0700	0.0539	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Cobalt-60	-0.0839	U	0.0722	0.0727	0.200	0.0683	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Lead-210	0.664	U		1.38	1.38	1.10	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Lead-212	0.551		0.100	0.123		0.0415	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Lead-214	0.563		0.152	0.163		0.0610	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Potassium-40	7.92		1.42	1.64		0.261	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Protactinium-231	-0.386	U	2.82	2.82		2.31	pCi/g	07/08/18 19:28	07/30/18 10:37	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S011**Lab Sample ID: 160-29324-11**

Date Collected: 07/02/18 09:22

Matrix: Solid

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Radium-226	0.494		0.143	0.152	0.700	0.0519	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Radium-228	0.526		0.223	0.230		0.0749	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Thallium-208	0.183		0.0678	0.0704		0.0268	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Thorium-228	0.551		0.100	0.123		0.0415	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Thorium-232	0.526		0.223	0.230		0.0749	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Thorium-234	1.39		1.24	1.25		0.748	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Uranium-235	-0.243	U	0.283	0.284		0.442	pCi/g	07/08/18 19:28	07/30/18 10:37	1
Uranium-238	1.39		1.24	1.25		0.748	pCi/g	07/08/18 19:28	07/30/18 10:37	1

Client Sample ID: PE2-RSYB5-U8-S012**Lab Sample ID: 160-29324-12**

Date Collected: 07/02/18 09:26

Matrix: Solid

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.568		0.163	0.173		0.0688	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Actinium-227	0.234	U	0.584	0.584		0.469	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Bismuth-212	-0.524	U	0.886	0.888		0.692	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Bismuth-214	0.509		0.136	0.146		0.0414	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Cesium-137	0.0150	U	0.0707	0.0707	0.0700	0.0571	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Cobalt-60	0.0300		0.0600	0.0600	0.200	0.0275	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Lead-210	0.109	U	1.27	1.27		1.04	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Lead-212	0.402		0.0954	0.109		0.0586	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Lead-214	0.561		0.118	0.131		0.0445	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Potassium-40	9.32		1.39	1.69		0.220	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Protactinium-231	-0.768	U	2.69	2.69		2.19	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Radium-226	0.509		0.136	0.146	0.700	0.0414	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Radium-228	0.568		0.163	0.173		0.0688	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Thallium-208	0.190		0.0643	0.0672		0.0263	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Thorium-228	0.402		0.0954	0.109		0.0586	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Thorium-232	0.568		0.163	0.173		0.0688	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Thorium-234	0.123	U	0.919	0.919		0.748	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Uranium-235	0.147	U	0.296	0.296		0.286	pCi/g	07/08/18 19:28	07/30/18 10:38	1
Uranium-238	0.123	U	0.919	0.919		0.748	pCi/g	07/08/18 19:28	07/30/18 10:38	1

Client Sample ID: PE2-RSYB5-U8-S013**Lab Sample ID: 160-29324-13**

Date Collected: 07/02/18 09:30

Matrix: Solid

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.258		0.164	0.166		0.257	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Actinium-227	0.0980	U	0.415	0.415		0.420	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Bismuth-212	-0.114	U	1.22	1.22		0.993	pCi/g	07/08/18 19:28	07/30/18 10:39	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S013**Lab Sample ID: 160-29324-13**

Date Collected: 07/02/18 09:30

Matrix: Solid

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.583		0.192	0.201		0.0684	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Cesium-137	0.0176	U	0.0850	0.0851	0.0700	0.0681	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Cobalt-60	-0.0732	U	0.0374	0.0381	0.200	0.0672	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Lead-210	-0.109	U	1.43	1.43		1.02	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Lead-212	0.463		0.105	0.121		0.0508	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Lead-214	0.570		0.136	0.148		0.0541	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Potassium-40	8.44		1.61	1.83		0.315	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Protactinium-231	0.000	U	0.863	0.863		2.39	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Radium-226	0.583		0.192	0.201	0.700	0.0684	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Radium-228	0.258		0.164	0.166		0.257	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Thallium-208	0.207		0.0685	0.0718		0.0224	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Thorium-228	0.463		0.105	0.121		0.0508	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Thorium-232	0.258		0.164	0.166		0.257	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Thorium-234	-0.225	U	1.49	1.49		1.06	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Uranium-235	0.0780	U	0.196	0.196		0.303	pCi/g	07/08/18 19:28	07/30/18 10:39	1
Uranium-238	-0.225	U	1.49	1.49		1.06	pCi/g	07/08/18 19:28	07/30/18 10:39	1

Client Sample ID: PE2-RSYB5-U8-S014**Lab Sample ID: 160-29324-14**

Date Collected: 07/02/18 09:34

Matrix: Solid

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.645		0.158	0.171		0.0224	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Actinium-227	0.0166	U	0.0643	0.0644		0.535	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Bismuth-212	0.300	U	0.545	0.546		0.420	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Bismuth-214	0.558		0.137	0.149		0.0531	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Cesium-137	0.0167	U	0.0566	0.0567	0.0700	0.0454	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Cobalt-60	0.0202	U	0.0624	0.0624	0.200	0.0300	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Lead-210	-0.676	U	1.49	1.49		1.20	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Lead-212	0.596		0.0877	0.117		0.0355	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Lead-214	0.647		0.125	0.142		0.0440	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Potassium-40	9.39		1.23	1.56		0.241	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Protactinium-231	-0.912	U	2.95	2.95		2.41	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Radium-226	0.558		0.137	0.149	0.700	0.0531	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Radium-228	0.645		0.158	0.171		0.0224	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Thallium-208	0.179		0.0611	0.0638		0.0259	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Thorium-228	0.596		0.0877	0.117		0.0355	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Thorium-232	0.645		0.158	0.171		0.0224	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Thorium-234	0.503	U	1.12	1.12		0.900	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Uranium-235	-0.00472	U	0.522	0.522		0.410	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Uranium-238	0.503	U	1.12	1.12		0.900	pCi/g	07/08/18 19:28	07/30/18 11:15	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S015**Lab Sample ID: 160-29324-15**

Date Collected: 07/02/18 09:38

Matrix: Solid

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.440		0.195	0.200		0.141	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Actinium-227	-0.421	U	0.981	0.983		0.792	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Bismuth-212	0.0147	U	1.16	1.16		0.958	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Bismuth-214	0.604		0.155	0.167		0.0602	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Cesium-137	-0.0489	U	0.0833	0.0835	0.0700	0.0650	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Cobalt-60	0.0469		0.0312	0.0316	0.200	0.0121	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-210	-1.88	U	1.58	1.60		1.67	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-212	0.535		0.108	0.121		0.0543	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-214	0.625		0.158	0.170		0.0645	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Potassium-40	9.39		1.40	1.69		0.122	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Protactinium-231	0.000	U	0.339	0.339		2.70	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Radium-226	0.604		0.155	0.167	0.700	0.0602	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Radium-228	0.440		0.195	0.200		0.141	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thallium-208	0.249		0.0646	0.0694		0.0150	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-228	0.535		0.108	0.121		0.0543	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-232	0.440		0.195	0.200		0.141	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-234	-0.166	U	1.67	1.67		1.38	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Uranium-235	-0.271	U	0.387	0.388		0.633	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Uranium-238	-0.166	U	1.67	1.67		1.38	pCi/g	07/08/18 19:28	07/30/18 11:16	1

Client Sample ID: PE2-RSYB5-U8-S016**Lab Sample ID: 160-29324-16**

Date Collected: 07/02/18 09:42

Matrix: Solid

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.759		0.280	0.291		0.103	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Actinium-227	-0.0701	U	0.573	0.573		0.489	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Bismuth-212	0.300	U	0.598	0.599		0.452	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Bismuth-214	0.154	U	0.128	0.129		0.211	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Cesium-137	-0.0164	U	0.0835	0.0835	0.0700	0.0676	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Cobalt-60	0.0107	U	0.0570	0.0570	0.200	0.0439	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Lead-210	1.04		1.21	1.22		0.796	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Lead-212	0.430		0.118	0.130		0.0742	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Lead-214	0.647		0.140	0.155		0.0643	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Potassium-40	9.90		1.54	1.85		0.254	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Protactinium-231	0.000	U	0.483	0.483		2.29	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Radium-226	0.154	U	0.128	0.129	0.700	0.211	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Radium-228	0.759		0.280	0.291		0.103	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Thallium-208	0.187		0.101	0.103		0.0478	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Thorium-228	0.430		0.118	0.130		0.0742	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Thorium-232	0.759		0.280	0.291		0.103	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Thorium-234	0.878		0.508	0.517		0.710	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Uranium-235	-0.0144	U	0.316	0.316		0.308	pCi/g	07/08/18 19:28	07/30/18 11:15	1
Uranium-238	0.878		0.508	0.517		0.710	pCi/g	07/08/18 19:28	07/30/18 11:15	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Client Sample ID: PE2-RSYB5-U8-S017**Lab Sample ID: 160-29324-17**

Matrix: Solid

Date Collected: 07/02/18 09:46

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.484		0.219	0.224		0.121	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Actinium-227	-0.0887	U	0.770	0.770		0.530	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Bismuth-212	-0.0137	U	0.713	0.713		0.586	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Bismuth-214	0.662		0.151	0.166		0.0552	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Cesium-137	0.0291	U	0.0629	0.0630	0.0700	0.0491	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Cobalt-60	0.00702	U	0.0122	0.0123	0.200	0.0460	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-210	1.09		1.64	1.65		1.03	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-212	0.535		0.103	0.124		0.0492	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-214	0.651		0.131	0.147		0.0593	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Potassium-40	8.99		1.40	1.67		0.326	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Protactinium-231	0.000	U	0.561	0.561		2.23	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Radium-226	0.662		0.151	0.166	0.700	0.0552	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Radium-228	0.484		0.219	0.224		0.121	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thallium-208	0.195		0.0686	0.0715		0.0307	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-228	0.535		0.103	0.124		0.0492	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-232	0.484		0.219	0.224		0.121	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-234	-0.407	U	1.30	1.30		1.09	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Uranium-235	0.149	U	0.176	0.177		0.352	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Uranium-238	-0.407	U	1.30	1.30		1.09	pCi/g	07/08/18 19:28	07/30/18 11:16	1

Client Sample ID: PE2-RSYB5-U8-S018**Lab Sample ID: 160-29324-18**

Matrix: Solid

Date Collected: 07/02/18 09:50

Date Received: 07/05/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.899		0.197	0.217		0.0385	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Actinium-227	0.411	U	0.928	0.929		0.746	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Bismuth-212	0.399	U	0.663	0.664		0.490	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Bismuth-214	0.625		0.177	0.188		0.0669	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Cesium-137	0.0390	U	0.0733	0.0734	0.0700	0.0564	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Cobalt-60	-0.00852	U	0.102	0.102	0.200	0.0501	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-210	-1.09	U	2.36	2.36		1.98	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-212	0.506		0.121	0.132		0.0658	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Lead-214	0.637		0.153	0.166		0.0692	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Potassium-40	9.47		1.65	1.91		0.428	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Protactinium-231	0.911	U	2.85	2.85		2.31	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Radium-226	0.625		0.177	0.188	0.700	0.0669	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Radium-228	0.899		0.197	0.217		0.0385	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thallium-208	0.277		0.0881	0.0925		0.0274	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-228	0.506		0.121	0.132		0.0658	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-232	0.899		0.197	0.217		0.0385	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Thorium-234	0.0135	U	1.94	1.94		1.59	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Uranium-235	-0.343	U	0.277	0.279		0.688	pCi/g	07/08/18 19:28	07/30/18 11:16	1
Uranium-238	0.0135	U	1.94	1.94		1.59	pCi/g	07/08/18 19:28	07/30/18 11:16	1

QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-374243/15-A

Matrix: Solid

Analysis Batch: 378220

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 374243

Analyte	Result	MB MB MB	MB MB MB	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert. (2σ+/-)	Uncert. (2σ+/-)					
Total Beta Strontium	0.04830			0.0614	0.0615	0.331	pCi/g	07/06/18 10:41	07/27/18 07:23	1

Carrier	%Yield	MB MB MB	MB MB MB	Spike	LCS	LCS	Total	DLC	Unit	%Rec.
				Added	Result	Qual	Uncert. (2σ+/-)			
Sr Carrier	92.4				40 - 110					

Lab Sample ID: LCS 160-374243/1-A

Matrix: Solid

Analysis Batch: 378547

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 374243

Analyte	Spike Added	LCS Result	LCS Qual	Total	DLC	Unit	%Rec.	Limits
				Uncert. (2σ+/-)				
Total Beta Strontium	8.22	8.680		0.689	0.331	pCi/g	106	75 - 125

Carrier	%Yield	LCS Qualifier	LCS Limits	Total	DLC	Unit	%Rec.	Limits
				Uncert. (2σ+/-)				
Sr Carrier	94.0		40 - 110					

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-374417/1-A

Matrix: Solid

Analysis Batch: 378611

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 374417

Analyte	Result	MB MB MB	MB MB MB	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac	
				Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.1177			0.0961	0.0969	0.0408	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Actinium-227	0.1861	U		0.818	0.818	0.663	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Bismuth-212	-0.3622	U		0.893	0.894	0.697	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Bismuth-214	-0.07550	U		0.127	0.127	0.181	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Cesium-137	0.01893	U		0.0458	0.0459	0.0238	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Cobalt-60	-0.04946	U		0.113	0.113	0.0529	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Lead-210	-1.986	U		1.93	1.95	1.69	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Lead-212	-0.01536	U		0.0885	0.0885	0.0733	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Lead-214	0.06439			0.0821	0.0824	0.0568	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Potassium-40	0.06795	U		0.815	0.815	0.388	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Protactinium-231	0.0000001	U		2.76	2.76	2.27	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Radium-226	-0.07550	U		0.127	0.127	0.700	0.181	pCi/g	07/08/18 19:28	07/30/18 23:47	1
Radium-228	0.1177			0.0961	0.0969	0.0408	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Thallium-208	0.004349	U		0.0646	0.0646	0.0365	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Thorium-228	-0.01536	U		0.0885	0.0885	0.0733	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Thorium-232	0.1177			0.0961	0.0969	0.0408	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Thorium-234	-0.5874	U		1.15	1.15	0.973	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Uranium-235	0.02373	U		0.0721	0.0721	0.423	pCi/g	07/08/18 19:28	07/30/18 23:47	1	
Uranium-238	-0.5874	U		1.15	1.15	0.973	pCi/g	07/08/18 19:28	07/30/18 23:47	1	

QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-374417/2-A

Matrix: Solid

Analysis Batch: 378612

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 374417

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total			%Rec.	Limits
		Result	Qual		LOQ	DLC	Unit		
Americium-241	96.8	91.14		9.58		0.545	pCi/g	94	87 - 116
Cesium-137	28.2	27.09		2.88	0.0700	0.0934	pCi/g	96	87 - 120
Cobalt-60	12.9	12.03		1.25	0.200	0.0487	pCi/g	93	87 - 115

Lab Sample ID: 160-29324-1 DU

Matrix: Solid

Analysis Batch: 378612

Client Sample ID: PE2-RSYB5-U8-S001

Prep Type: Total/NA

Prep Batch: 374417

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total			RER	Limit
					Uncert. (2σ+/-)	LOQ	DLC		
Actinium 228	0.704		0.7593		0.156		0.0420	pCi/g	0.14
Actinium-227	0.0863	U	-0.07295	U	0.646		0.400	pCi/g	0.19
Bismuth-212	0.288	U	0.0000	U	0.414		0.464	pCi/g	0.25
Bismuth-214	0.535		0.5753		0.131		0.0375	pCi/g	0.15
Cesium-137	-0.0145	U	-0.01894	U	0.0449	0.0700	0.0422	pCi/g	0.04
Cobalt-60	-0.0522	U	0.008420	U	0.0329	0.200	0.0220	pCi/g	0.62
Lead-210	0.837		0.03091	U	1.24		1.02	pCi/g	0.34
Lead-212	0.567		0.4465		0.136		0.0847	pCi/g	0.45
Lead-214	0.564		0.5678		0.125		0.0406	pCi/g	0.01
Potassium-40	9.60		8.575		1.48		0.247	pCi/g	0.31
Protactinium-231	0.000000	U	0.0000	U	0.602		2.00	pCi/g	0
	221								1
Radium-226	0.535		0.5753		0.131	0.700	0.0375	pCi/g	0.15
Radium-228	0.704		0.7593		0.156		0.0420	pCi/g	0.14
Thallium-208	0.253		0.2332		0.0550		0.0105	pCi/g	0.17
Thorium-228	0.567		0.4465		0.136		0.0847	pCi/g	0.45
Thorium-232	0.704		0.7593		0.156		0.0420	pCi/g	0.14
Thorium-234	0.553	U	0.8282		0.637		0.458	pCi/g	0.18
Uranium-235	0.0756	U	-0.1834	U	0.0874		0.401	pCi/g	0.99
Uranium-238	0.553	U	0.8282		0.637		0.458	pCi/g	0.18

QC Association Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Rad**Leach Batch: 374096**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29324-1	PE2-RSYB5-U8-S001	Total/NA	Solid	Dry and Grind	
160-29324-2	PE2-RSYB5-U8-S002	Total/NA	Solid	Dry and Grind	
160-29324-3	PE2-RSYB5-U8-S003	Total/NA	Solid	Dry and Grind	
160-29324-4	PE2-RSYB5-U8-S004	Total/NA	Solid	Dry and Grind	
160-29324-5	PE2-RSYB5-U8-S005	Total/NA	Solid	Dry and Grind	
160-29324-6	PE2-RSYB5-U8-S006	Total/NA	Solid	Dry and Grind	
160-29324-7	PE2-RSYB5-U8-S007	Total/NA	Solid	Dry and Grind	
160-29324-8	PE2-RSYB5-U8-S008	Total/NA	Solid	Dry and Grind	
160-29324-9	PE2-RSYB5-U8-S009	Total/NA	Solid	Dry and Grind	
160-29324-10	PE2-RSYB5-U8-S010	Total/NA	Solid	Dry and Grind	
160-29324-11	PE2-RSYB5-U8-S011	Total/NA	Solid	Dry and Grind	
160-29324-12	PE2-RSYB5-U8-S012	Total/NA	Solid	Dry and Grind	
160-29324-13	PE2-RSYB5-U8-S013	Total/NA	Solid	Dry and Grind	
160-29324-14	PE2-RSYB5-U8-S014	Total/NA	Solid	Dry and Grind	
160-29324-15	PE2-RSYB5-U8-S015	Total/NA	Solid	Dry and Grind	
160-29324-16	PE2-RSYB5-U8-S016	Total/NA	Solid	Dry and Grind	
160-29324-17	PE2-RSYB5-U8-S017	Total/NA	Solid	Dry and Grind	
160-29324-18	PE2-RSYB5-U8-S018	Total/NA	Solid	Dry and Grind	
160-29324-1 DU	PE2-RSYB5-U8-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 374243

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29324-1	PE2-RSYB5-U8-S001	Total/NA	Solid	DPS-0	374096
160-29324-11	PE2-RSYB5-U8-S011	Total/NA	Solid	DPS-0	374096
MB 160-374243/15-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-374243/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Prep Batch: 374417

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29324-1	PE2-RSYB5-U8-S001	Total/NA	Solid	Fill_Geo-21	374096
160-29324-2	PE2-RSYB5-U8-S002	Total/NA	Solid	Fill_Geo-21	374096
160-29324-3	PE2-RSYB5-U8-S003	Total/NA	Solid	Fill_Geo-21	374096
160-29324-4	PE2-RSYB5-U8-S004	Total/NA	Solid	Fill_Geo-21	374096
160-29324-5	PE2-RSYB5-U8-S005	Total/NA	Solid	Fill_Geo-21	374096
160-29324-6	PE2-RSYB5-U8-S006	Total/NA	Solid	Fill_Geo-21	374096
160-29324-7	PE2-RSYB5-U8-S007	Total/NA	Solid	Fill_Geo-21	374096
160-29324-8	PE2-RSYB5-U8-S008	Total/NA	Solid	Fill_Geo-21	374096
160-29324-9	PE2-RSYB5-U8-S009	Total/NA	Solid	Fill_Geo-21	374096
160-29324-10	PE2-RSYB5-U8-S010	Total/NA	Solid	Fill_Geo-21	374096
160-29324-11	PE2-RSYB5-U8-S011	Total/NA	Solid	Fill_Geo-21	374096
160-29324-12	PE2-RSYB5-U8-S012	Total/NA	Solid	Fill_Geo-21	374096
160-29324-13	PE2-RSYB5-U8-S013	Total/NA	Solid	Fill_Geo-21	374096
160-29324-14	PE2-RSYB5-U8-S014	Total/NA	Solid	Fill_Geo-21	374096
160-29324-15	PE2-RSYB5-U8-S015	Total/NA	Solid	Fill_Geo-21	374096
160-29324-16	PE2-RSYB5-U8-S016	Total/NA	Solid	Fill_Geo-21	374096
160-29324-17	PE2-RSYB5-U8-S017	Total/NA	Solid	Fill_Geo-21	374096
160-29324-18	PE2-RSYB5-U8-S018	Total/NA	Solid	Fill_Geo-21	374096
MB 160-374417/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-374417/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-29324-1 DU	PE2-RSYB5-U8-S001	Total/NA	Solid	Fill_Geo-21	374096

Tracer/Carrier Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29324-2

Method: 905.0 - Total Beta Strontium (GFPC)**Matrix: Solid****Prep Type: Total/NA****Percent Yield (Acceptance Limits)**

Lab Sample ID	Client Sample ID	Sr Carrier (40-110)										
160-29324-1	PE2-RSYB5-U8-S001	91.6										
160-29324-11	PE2-RSYB5-U8-S011	93.6										
LCS 160-374243/1-A	Lab Control Sample	94.0										
MB 160-374243/15-A	Method Blank	92.4										

Tracer/Carrier Legend

Sr Carrier = Sr Carrier

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